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THE PASSING OF SURGICAL YEOMEN

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AN ORATION postulates an orator. When, therefore, an oration is ventured by one neither oratorically endowed nor trained, only natural is query as to the propriety of the caption. Custom, however, ofttimes violates the true meaning of words until their new connotations come to be tolerated without undue qualms. That this society is by no means innocent of abetting such neologic misdemeanor is apparent on scanning the list of past occupants of this rostrum. There seem to have been very few orators. Be that as it may, they triumphed, one and all, with the brilliance and worth of their offerings. The honor of being chosen to this company of the specially ordained is signal. The task of nearing the standard they set is awesome. Yet earnestly withal has this year's conscript striven to be worthy of his hire. He stands here in all humbleness as his becomes the latest name added to that famed roster whose luster he can only hope will not thereby be unduly dimmed.

Yeomen are gallant men who render great and loyal service. The title was first bestowed on those chosen for their valor and lealty to be trusted bodyguards for kings and nobles. Somewhat later whole companies of tried loyalty were so dubbed; and later still regiments that to this day are proud of their traditional crest. In all the world's wars yeomen were the backbone of armies and the mainstay of navies. As conflicts waned and peacetimes came oftener and lasted longer, and as unwarlike pursuits were more generally followed, the honored title of yeoman was given men who otherwise than as soldiers rendered equally great and loyal service. So through the years the order of yeomanry gained in stature, luster and good repute. In husbandry and trade; in the crafts and arts; in the missions of priesthood and teaching; in all lines of human endeavor, the staid and sturdy men were the yeomen. Lords over none, under human bondage to no man, they were freeborn commoners. Without any ado they went earnestly and noiselessly about their business. Never did they vision quick reward, but rather the lasting joy and contentment from good works well done. For them sufficient unto the day was the labor thereof. Their virtues were their reward. For their reserve and unobtrusiveness they went unnoted and unsung the while they did the bulk of the world's work. They were the builders of wealth, the winners of knowledge, the guardians of morality. As once they were the might and power of wartime forces, so later in peace were they the strength and the weal of social, economic and civic orders; the bulwark of the state, the leaven of civilization, the wellspring of culture.

> Hence were they resolute,
> Leading the van on every day of battle,
> As men who knew the blessings they defended.
> They were worth their breeding, which doubt not;
> For there was none of them so mean and base
> That had not noble luster in his eyes.

Such were yeomen. Their order still lives with all its noble traditions, but its solid ranks of old are thinned. Sturdiest of the league, truest to its unwritten precepts, surest hope for its salvation, are surgical yeomen. They are the grandsons of stanch and peerless forebears, the rank-and-file physicians of yesteryear. These grandsires were the common doctors, they of the commonalty, but of the first and most respected class. For the most part they were countrymen or everyday citizens, physicians of the district. Impelled not by force from without, but from within by the drive of their own strong natures, they were masters of their own destinies; and in all times the strength, the spirit and the glory of the profession. Workers, not idlers; followers but not stragglers; thinkers, not dreamers; servants but not slaves, they bred in themselves the self-respect, the self-reliance, the self-discipline and the self-culture that were priceless gifts to the commonweal of medicine. Neither great renown nor great riches was often

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theirs. True to their self-chosen order of yeomanry, they were the hewers of wood and the carriers of water. Through the years their good works went unsung until in the fullness of his heart Robert Louis Stevenson wrote:

> There are men and classes of men that stand above the common herd; the soldier, the sailor, and the shepherd not infrequently; the artist rarely; rarelier still the clergyman; the physician almost as a rule. He is the flower (such as it is) of our civilization; and when that stage of man is done with, and only remembered to be marveled at in history, he will be thought to have shared as little as any in the defects of the period, and most notably exhibited in the virtues of the race. Generosity he has, such as is possible to those who practice an art, never to those who drive a trade; discretion, tested by a hundred secrets; tact, tried in a thousand embarrassments; and what are more important, Heraclean cheerfulness and courage. So it is that he brings air and cheer into the sickroom, and often enough, thought not so often as he wishes, brings healing.

About the time this tribute to the family doctor was penned, a new order was forming within the ranks of medical men. It was joined by those general practitioners with leanings and flairs for surgery. Into the new fields opened up by Lister's gift they drove. They were the pioneers of modern surgery. With boundless faith in their art and with courage undaunted by difficulties and early failures, they pressed on with a daring that bespoke their skill and a caution that vouched their wisdom. They need this late day no inspired bard or rare scribe to do them homage. Theirs are names that live.

It was from these pioneers that sprang a race of surgeons. Some of this second generation, those richest endowed with quick heads, daring hearts and deft hands, have become renowned masters of their art. They, like their fathers before them, need this day no recalling. Rather is it their lowly brethren, that host of general surgeons, long lost from mind and eye in the far-flung surgical world, who, overlooked and unrated, merit, nonetheless, appraisal which has never been vouchsafed. They are the surgical yeomen.

In this day and hour they are the old guard, in large measure self-made surgeons. Their medical-school course and their training as surgical interns were, judged by present lights, meager indeed and of little worth. Surgical teaching was encumbered with tradition. Operative fields were not many. Years of trial and error had not yielded refined and standardized technic. The tools of the craft were far from perfected. Care before as well as after operation was little understood, therefore crude and sometimes harsh. But the old guard never faltered. Their own guides on often strange and sometimes uncharted ground, they found their own way. Despite their stinted schooling and training, steadied by common sense, backed by resourcefulness, impelled by need, they overcame their handicaps, and day in and day out have given earnest of the sterling worth of head and hand.

These surgical yeomen did, however, have a priceless course of training, nowadays rather disdained. Most of them, for one reason and another, began as general practitioners of medicine, and followed that calling for several years. As family doctors they took on stature and grew wise in the art of practice, which is the same, be it medical or surgical, — an art, too, which is better mastered at the family bedside than in the hospital ward. Not that they neglected surgery. Quite the contrary: they saw to it that they were known as physicians who did surgery. When the time came for them to break away from general practice, enough surgery was forthcoming from their lay followings to tide them over the transitional years before medical brethren entrusted to them patients for operation. Whatever sins of omission this apprenticeship of yesteryear may have had, it had few, if any, of commission; and it did have virtues which, if they awarded little of scientific merit, did have something to do, indirectly at least, with the making of dependable and beloved surgeons.

Started on their careers with handicaps of underschooling and inexperience, they found their chosen course roughened by hazards that only their fortitude and resourcefulness overcame. They had neither drilled assistants nor skilled anesthetists. For many reasons, most of them needful, some becoming, but a few, alas, sordid, all too often they had to tolerate across the table a doctor unused to surgical technic, and at the head another untutored in giving ether. Of the two the former was more easily borne. His clumsy and risky doings could be watched and guarded against while the operator did all the work himself. The anesthetist, however, was a tougher problem. Etherizing, quite commonly looked down upon as a drab and menial chore with none of the glamorous appeal of the operating room, was usually a leftover job for whosoever at the moment was not otherwise busy. It was, then, not at all strange that these casual anesthetists, unfitted for the task and with untoward interest in the open abdomen, too many times harried overburdened surgeons with blue-lipped, wet-throated, rigid, straining patients, or not rarely with pallid, faintly sighing forms whose toneless muscles heralded oncoming shock. Furthermore, the tools of these surgical craftsmen were not always of the latest pattern, the fittings and structure of their workshops were like as not

outdated; but from long and close companionship they were endeared to their owners who learned well to use them handily. Indeed, it was no rare feat for them to operate in the home, on the kitchen table, with dry goods from their own Arnold sterilizers, and with instruments boiled on the family cookstove. These and other hardships, endured and transcended, have richly endowed this race of surgical yeomen with the unconquerable spirit, the unshakable poise and the steadiness of mind and hand that only trials unflinchingly faced and resolutely overcome can bequeath.

The first aim of the old guard has ever been to get sick people well. Eager for the learning and skill that would grant them that power, they left no stone unturned to acquire them. They had no urge to be scholars and laid no claim to that high estate; they were just diligent, lifelong students. They read chiefly the pick of weekly and monthly journals, for they knew that most new books were already outdated when published. To quicken their minds they went often to meetings of their peers, there to listen closely, to speak seldom; and better to guide their eager hands, oft as might be though rarelier than they wished, they stole away to surgical meccas where, watching masters, they picked up new leads to diagnosis, new tricks of technic, new wards against disaster and new handling of mishaps.

Of such sterling stock and self-willed discipline are surgical yeomen. There are still a goodly number of them in the land; how many, there is no telling. True to the order of yeomanry, they are the forgotten ones who staff the many hospitals in byways of cities and at rural crossroads. Day in and day out these willing craftsmen go quietly about their business here, there and everywhere, never exploited by the press. And so it is that, notwithstanding master surgeons and their hand-picked helpers in famed clinics, the bulk of the country's surgery is really done by a company of forgotten men.

Mere quantity, however, is no token of the scope and kind of surgery they do. While the former is perhaps not of the widest, its range is by no means narrow. Annual reports from thirty small-town hospitals east of the Mississippi list about the same run of operations as do large clinics, for appendicitis, rupture, gall-bladder disease, cancer of the breast, empyema, pelvic tumors, childbirth repairs and a multitude of traumatic ills. In many there is a quite sizable ratio of thyroidectomies, stomach and bowel resections, splenectomies and rectal excisions, to say naught of orthopedic, urological and some thoracic operating where, be it noted, no specialists are registered. This is no narrow reach of surgical endeavor. More's the wonder, it is spanned not in part by one man here and another there, but in its entirety by most yeoman surgeons. Each and every one of them stands in readiness to take out a gallbladder today, a thyroid tomorrow and a prostate the day after. Spontaneous and natural it is to marvel at the deftness and skill of a master who numbers his thyroidectomies in the thousands, but could he be otherwise with such vast experience? The real wonder is that yeomen who do perhaps one or two, or even less a week, can remove goiters with the dexterity they do.

In order to rate the quality of surgery done anywhere, resort must be had to figures. That is always a risky venture, for statistics can be made to prove almost anything. There are two yardsticks for measuring the worth and benefits of surgery: mortality and morbidity. Now, well-being after operation is not at all easy to record. Percentages of results good and results bad are apt to be gay deceivers, playing, as they unwittingly do, patients' emotional self-appraisals against surgeons' optimistic desires. Happy outcomes can be stressed, feigned or hidden by human frailty on the one hand; and on the other, setbacks can be as easily sidetracked, pardoned or shaded by equally human professional zeal. From their very nature, then, morbidity statistics are too sensitive to warping to be nice measuring rods. The death rate, on the contrary, is, save for the chance upset of wrong diagnosis, quite positive and accurate; whatever else betides, patients either live or die. Whether or not low mortality is the chief aim of surgery, it is still on the whole the truest token of its worth, the surest common yardstick for all surgeons.

Averaged from hospital reports, the general surgical death rate at the hands of six master surgeons is 4.6 per cent; of thirty scattered yeomen 4.8 per cent, a creditable showing indeed for the lowly ones. This near parity of outcome is of course wide open to attack. That surgical lords who handle the more hazardous jobs do not have a worse mortality is for them a credit just and merited, but, alas, so intangible it cannot be figured. In all fairness, too, must it be admitted that yeomen, by shunting their more perilous work onto their betters, thereby escape a debit equally merited, but likewise too fitful for computation. Righteous as they seem, however, these entries do not tip the scale but are balanced by factual items. Chieftains, too, have their quota of easy jobs, and as for hard, dangerous and unusual operating, not only are they outfitted and skilled therefor, but they yearn for it. Inasmuch, then, as they bid for it, they should willingly pay the toll. On the

other side of the sheet yeomen not at all rarely find themselves of a sudden faced with most difficult operations. There is no forecasting of surgical hazards. What gives every promise of simplicity may easily prove to be otherwise. And there is no turning back; yeomen have to meet the problem, solve it as best they can and let the chips of mortality fall unbegrudged wheresoever they may. If, forewarned, they choose to dump their desperate jobs onto others, they do but show a wisdom that acknowledges their shortcomings, and a stand by their own conviction that needless mortality has no justification.

When the death rates for specific surgical ills are likewise compared, the scales are still pretty level. Mortalities after herniorrhaphies, cholecystectomies and other common as well as rarer ordeals show but a few decimal points in favor of the lords and masters. With the balance sheet running steadily though slightly in the same direction, it was most enlightening to have figures come forth which seem to prove that in one of the commonest abdominal ailments yeomen have the edge. The finding was most pleasing, too, for surgery today suffers no more stinging rebuke than its showing in appendicitis. All vital statistics vouch beyond peradventure that more people are now dying of appendicitis than ever before. Lay scribes are featuring the ill turn of appendiceal mischief with now and then an air of grim and only half-hidden content. In sober vein, current medical writers bewail the blemish on surgery's escutcheon, but are seemingly at odds with one another over what to do about it. It should be noted, however, that the authors of the surgical lamentations are the leaders in big metropolitan hospitals, the heads of large clinics or their hand-picked lieutenants. The experience of chieftains is so vast it is sort of taken for granted that the results of all others are the same. Of late, however, several surgical yeomen have challenged this inference, and as yet it is not recorded that the gauntlet they threw down has been taken up. Their case rests on figures from three sources: federal records of vital statistics, reports from twelve large clinics and accounts from twenty small hospitals. For the whole country the general death rate of appendicitis hovers from year to year around 3 per cent; for appendectomy in acute and non-perforated cases it is 4.8 per cent; but when complicated by peritonitis the rate jumps to 30 per cent. Taking these national figures as mean levels, the challenging yeomen plot some rather upsetting extremes. Whereas the head surgeons list a general mortality for appendicitis of 4.5 per cent, they achieve one of 2.1 per cent. For all acute cases the former confess a death rate of 6.8 per cent; the latter of only 3.1 per cent. And when peritonitis adds its horror, the figures are widest apart: 38.5 per cent against 17.7 per cent. Not content with this pleasing triumph, the challengers go on to show that all records award them in the last decade a yearly drop in death rate, a fall which seems to have eluded their big brethren. There they rest their case. With their usual becoming modesty they vaunt no reasons for their better showing; and with forbearance and kindness learned through many mishaps of their own, they hint no causes for the less happy outcomes of others. In a spirit of fair play, and with an equanimity born of facts, they choose to await in calm contentment the issue of rebuttal.

For the hiding of their good works the old guard themselves are most to blame. They have been too busy to write of their doings, too reticent to speak of them. Their lives have been spent in the rough and tumble of the surgical game, which for long they had to play with the odds against them. Year by year through their own pleadings they have awakened their people to the need for better hospitals, and through their own drive they have brought their workshops up to date. More and more have they picked and trained loyal teams of helpers, and by friendly pleas here and not altogether unkindly insistence there, have won over the layman and his doctor to the gospel that patients fare better with teamworkers than at the hands of casual helpers and etherizers. As they have gained these welcomed changes they have rid themselves of many a hindrance, of many a stress, and have come to the height of their skill and wisdom with the right and the freedom at last to use them to the full.

But these thoroughbreds of the family are more than surgeons; they are gentlemen of the first order, kindly and courteous to all, honoring their leaders, gracious toward their fellows, helpful to younger brethren. In them power and modesty walk together, rare companions these days of might and vainglory. Each in himself is the champion American individualist. He is wedded to the old ways of the surgical art, swayed not by oncoming, thinly disguised mass practice. He was reared in the days when sick people were persons, not records, and he never forgets his bringing up. He knows naught, for example, of a pelvic case in Room 26; but in that bed he has his patient, mother of three children aged two, seven and nine, overworked housewife worrying about her home, Mrs. Mary Jones, whose bleeding fibroid uterus he took out four days ago. The kindly,

personal touch is always with him. When his patients go home from the hospital, he does not hand them wholly over to other doctors, but himself in friendly part watches them through the aftermaths of their ordeals and himself handles the petty discomforts prone later to arise. By so doing he has learned little ways to forestall no few of the untowardnesses that operative haste and postoperative inattentiveness inflict. His reward is an easier, shorter recovery for patients than is sometimes won by others who, interested in records more than in persons, hand over their cases at an early date to the mercies of this or that kindly but less adept family doctor.

Gentleman by habit, surgeon by training, by his faith he is sworn guardian of his calling. Eager and ready to turn to good account the stupendous gains in surgical knowledge, he stands abashed at the strange ways some people would have that knowledge used for suffering mankind. He wonders at the suave effrontery of outsiders who, with insight dim, would nonetheless tell him how best to handle the ills of the people. With the wealth of understanding that is his from a life spent on the firing line, he knows that, despite the social angles the meddlers stress, the true practice of medicine and surgery is personal and individual. For him that is the solid rock on which his calling was built; and on that firm base it has through the ages grown to stature that commands respect for the doctor, though oft, alas, denied the profession at large.

There is good reason to fear that the fate of this race is to be forgotten while here, remembered only when gone. Already there are signs and omens round and about that the order of surgical yeomen and what it stands for are passing. Many a town and urban district are seeing the last of them. Their times and ideals are seemingly outlived; the new day and its values are different.

> The old order changeth, yielding place to new;
> And God fulfills Himself in many ways,
> Lest one good custom should corrupt the world.

Without going into the causes thereof, the surgical craft is being more and more split into specialties. The division of labor without any doubt makes for better surgery; but whether it also makes better surgeons may be questioned. More soundly taught and more sharply trained, the new order has greater learning. Whereof the old-timers, with only long-tried empirical lore, had to guess shrewdly, — though usually right, — the newcomers speak with scientific certainty. Yet somehow the cold, sober logic lacks the warm personal touch of the yeomen. Mayhap the latter did now and then with their manner and speech cloak their ignorance, but they did therewith spread "air and cheer" in the sickroom. Worried parents and relatives do after all like their draughts of science sweetened with human kindness.

Though surgeons of the hour are more deft of hand than their yeoman sires, each is apt to be so only in his chosen and narrow field. And he sticks pretty close to his own bailiwick, whose no-trespass signs he would have heeded as he himself heeds others all about him. On grounds other than his own he does not feel at home, and therein is his weakness. Specialties overlap, and many a borderline illness straddles a surgical line fence. Does a man with a broken back and some signs of cord mischief belong to the orthopedist or the neurological surgeon? If given into the hands of one, the patient may later develop symptoms that call for the skill of the other, whereupon the first expert has either to call upon the second for aid, which sometimes, alas, is honest clash of opinion, or himself muddle along as best he may. The victim must then either swap horses in the middle of the stream, risk his welfare to a balky team or chance a floundering. It can scarce be maintained that any of these choices grants the sufferer the faith in his surgeon and the peace of mind for himself that lessen worry and make for kindly outcomes.

Every year brings forth new measures of organic function, new tests for disease, new mechanical aids to sight, hearing and touch. Scientific beyond all peradventure each and every one of them adds to better understanding of disease, but for a single patient any one of them may easily be misleading. Each is focused not on the whole of any one disease, but on just one, perhaps small, aspect which it may overilluminate. Despite this and other forewarnings, however, newly trained surgeons show a tendency to overrate now one and now another promising but unseasoned helpmeet. Seemingly too they ofttimes lack the faith of their fathers in the findings of their own eyes, ears and fingers, and put their trust rather in new-found guides who, though meaning well, sometimes lead them into grievous error. And scientific though the guidance be, it is not firsthand. For the most part the handling of such measures, tests and aids is beyond the ken and scope of clinical surgeons and is left perforce to biological chemists, roentgenologists, pathologists and the like. The surgeon thus has to accept not only the findings of these cloistered though earnest workers, but also their reasonings. Instead, then, of a firsthand, clear-cut picture of the patient and his disease, he sometimes finds he has a puzzling clutter of ill-matched,

narrow-field negatives which he must shuffle and strive to fit together.

Not so has the surgical yeoman been troubled or led astray. As science came into his life, rarely did it upset his long-tried empirical knowledge. At times it shifted his beliefs a mite, but more often it confirmed them. Long forced to do without scientific helpmates, he had trained his own senses to catch the faintest of untoward signs, had schooled his brain to sift and value all his findings. When a perfected measure, test or aid came forth, his common sense quickly rated it, his well-ordered mind neatly stowed it away, and his wisdom made of it a means and not an end. If his touch told him the broken leg was about the length of the other, the weight-bearing line true and the ends of the bone in good contact, he was not to be rushed into resetting because x-ray showed that the fragments were not meeting wholly end to end. Nor did he dally with acute appendicitis because the white-cell count was not high. The way a man lav in bed, the look on his face, the strength of his voice and handclasp; the cry and grunt of a sick child; the stare of a tearless woman, these and countless other like signals of distress told him at a glance things about his patient no test tube or microscope can ever reveal. It was not playing hunches, it was not just intuition, and it was not snap guesswork; it was free play of his wisdom. Often hard put to rationalize his opinions, he was sometimes wholly stumped for explanations. He had seen these things many times and had come to know what they meant. He knew human bodies, their modes of expression, their moods of behavior, and what they signified; and above all he knew human nature and was seldom to be fooled by its vagaries. Not that he frowned on laboratories; quite the contrary, he was deeply grateful for all they taught him about disease. He turned to them often and gladly for needed help; valued their judgments but did not let them confuse him. When their reports confirmed his opinion, he was heartened for his patient's sake; but when they ran counter to his clinical reasoning, again and again reviewed, he put his trust in his own long-tried senses, which had rarely led him far astray.

They have had full lives, these surgical yeomen. For some, toil is over. For many more, years of labor are numbered. Plenty are the omens that this old guard is passing; that many a town and urban district are having their last good general surgeons. Gloomy forebodings notwithstanding, faith in surgical yeomanry's ideals still lives. Remnants of the order, scattered and unorganized, tend the hallowed light and keep it burning. Here and there bands of the faithful are heartened by tokens of an awakening that holds forth promise for their order. Far in the offing are faint rumblings of discontent with some of the surgical fashions of the day, rumbles that seem to be growing in volume. Grumblings against overspecialization are making themselves heard in high places where heed is being given to thoughtful critics. Only partly muffled are plaints that chairs of clinical surgery might best be held by teachers who, well bred in family bedside manners, would drill their pupils in the art as well as in the theory of practice, and would show them how to treat not just sickness but sick people too. Less and less withheld are discreet whisperings of family doctors that when in need of counsel they are finding in one good surgical yeoman the common sense, the help and the cheer for themselves and their patients that surgical specialists with all their scientific learning so often fail to bring. It is unlikely, however, that these and other voices from within the realms of medicine will do for the cause as much as will future uprisings of laymen. Hushed for now, but some day to be loud indeed, will be the cries of disillusioned men and women against the regimentation and mass practice which social and political meddlers seem about ready to impose. Until that public awakening dawns, the old guard can with patience and kindly forebearance await its coming. Then perchance will yeomen come into their own again. Then will their thinned ranks be recruited, and the blessings, the honored ways and the sterling ideals of surgical yeomanry be saved.

Meanwhile a new order holds sway. It is quite different from the old and has a different touch. It seems destined to do better surgery, but whether its workers will be better surgeons only the years can tell. To those who know the old order best, its passing, together with its standards of service, brings a tinge of sadness and misgiving. Mayhap yesteryear, when their fathers were dying, like doubts were held about this old guard then untried; and by the same token the new order may tomorrow prove today's fears ungrounded too. Just as a heedless world has only of late paid tardy acclaim to its pioneer surgeons, so will it likely be years hence before it bestows equally merited praise on its yeomen. In some future age, when the idea of ruling the world according to the whims of a fanciful social conscience has run its bewildering course, and when individual consciences have come again to the fore, then will there be wishful return to some of the good old

ways of yore. And in that new age may another Stevenson be inspired to extol at long last the passing old guard of today. Until that time comes, this heartfelt tribute is paid them by one whose lasting joy and satisfaction will ever be that the rich and happy years of his professional life were spent at the side of a surgical yeoman.

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THE RELATION OF NEWER DRUGS TO PUBLIC HEALTH

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THE topic assigned to me presents an unusual aspect of pharmacology, though this science, like public health, maintains contact with all other fields of medicine. The recent tragic deaths from the use of diethylene glycol as a solvent for sulfanilamide have emphasized the relation between medicaments and the public health. Indeed the sciences of pharmacology and of public health are allied in type. Both, by their nature, have not developed technics *sui generis,* but use the methods of all the medical sciences directed toward certain goals, defined by the point of view from which each approaches its problems. Pharmacology focuses the separate technics which it uses on the elucidation of the qualitative and quantitative effects of drugs on the animal and plant body and the mechanism of such action as may be produced; similarly public health directs its efforts toward anything that concerns the welfare of our citizenry.

A discussion of the relation of public health to newer drugs necessarily concerns itself with methods of treatment and is a part of the more general topic of the relation of the public-health authorities to the practice of medicine and to the manufacture and dispensing of drugs. Pharmacology in the medical school concerns itself or should concern itself with preparation of the medical student for the use of drugs as tools in his hands for the cure or comfort of the patient. At this period of the student's career the discussion of proprietary remedies, patent medicines and over-the-counter self-medication should be emphasized. Expansion and reiteration of this teaching in the clinical years of the medical school and in the field of preventive medicine is necessary, but is deficient in most schools. After graduation it should become the concern of the legally constituted health authorities to keep the physicians under their jurisdiction continually conscious of these pitfalls of therapeutics. In this the help of graduate schools of medicine should be enlisted. Lack of such teaching increases the burden of the health authorities in their efforts to safeguard the public health. Education, continuous and unremitting, is the only practicable method of breaking down the hold that proprietary medicine has upon the medical and lay public.

With all the efforts that have been made to prevent fraud upon the public, such as the activities of the Food and Drug Administration of the United States Department of Agriculture and of the Council on Pharmacy and Chemistry of the American Medical Association, it has been impossible to provide really adequate legislation. The reason for this is that the problem resolves itself into the simple but thorny one of "truth in advertising," together with a revision of our copyright and patent laws. But a start in this direction has certainly been made. If local health officials can be made acutely conscious of the dangers of the use of proprietary names for common substances, and of secret or semi-secret mixtures, they can do much, even under existing legislation, to diminish these evils by appropriate health education among citizens and physicians.

Six points of contact occur to me at which pharmacological advice becomes essential for adequate formulation of recognized public-health activities. These are as follows:

The supervision and adequate testing of new antiseptics and germicides.

An evaluation of the drugs introduced for the treatment or cure of contagious diseases.

The maintenance of high standards, both in manufacture and in dispensing of drugs.

The investigation of the toxic manifestations of drugs, whether exhibited in suicide, homicide or accidental death.

The determination of industrial hazards from chemicals, and investigation of the use of various toxic substances in the treatment of foods.

The control of the use of new drugs or new mixtures which may appear on the market without adequate clinical trial.

It is evident that these six items involve the whole question of the relation of public health to the practice of medicine. The problem reduces itself to the question of how far the governmental health authorities should intrude into the field of practice. In the evolution of our present state departments of public health it is undeniable that the state has invaded the domain of medical practice to

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a surprising degree. Mental diseases, tuberculosis and cancer are essentially part of our public-health set-up. Serums and vaccines are made in state laboratories, and their distribution and administration are controlled by state health departments. In Massachusetts one drug is even manufactured by the State. That these developments will proceed further as time goes on seems inevitable. Whether we will or no, we are destined to an increasing development of governmental influence in matters of public health; what is even more significant, more and more subjects are going to be the concern of public-health officials. If this prediction be correct, what is the direction in which we should guide this development so far as it may concern pharmacology and drugs in general? The valiant efforts of the United States Food and Drug Administration and the Council on Pharmacy and Chemistry point the way. Constant education of the doctor and through him the lay public is the method chosen by the council. The Food and Drug Administration has been alert to pounce upon every violation of the law, defective as it is, even if the violator seemed unimportant so far as the extent of his operations was concerned. The tendency of many departments of public health, on the other hand, has been to expand facilities for medical care, when public education directed toward eliminating the waste of money on patent medicines might almost make unnecessary the provision of additional facilities for the "medically indigent." All the reports on the cost of medical care indicate that as much is spent in the United States for patent medicines as for all other types of medical service combined.

A first and most constructive step would be to remove from the class of medically indigent those who spend their hard-earned wages on patent medicines. How may this be done, and how does it concern public-health officials? It may be effected in two ways: by education and by legislation. It is a paramount duty of health officials to teach the public the stupidity of self-medication, the evils of proprietary drugs and the dangers of patent medicines. The only agencies that have courageously attacked this problem are the Council on Pharmacy and Chemistry and the Food and Drug Administration; the latter is hampered by being a governmental agency. It is sad to see the lack of support in this vital campaign that is exhibited not only by the rank and file but even by the leaders and teachers in medicine, including those who hold advanced social views on the place of medicine in the body politic. These are the ones who perpetuate the use of proprietary names and thereby double the cost of medicine to their patients — money that could be used to relieve the medically indigent. An indirect effect of this practice is the encouragement of self-medication and the consequent establishment of a relation between druggist and patient that indirectly makes the latter easier prey for the patent-medicine advertisement.

It seems unnecessary to emphasize this further. Illustrations will readily come to mind. Recent events have emphasized the great importance of adequate control of the marketing of newer drugs. Conscienceless manufacturers may introduce toxic substances without hesitation, and it is only by constant vigilance that public-health officials can prevent tragedies such as have lately occurred through the marketing of diethylene glycol as a solvent for sulfanilamide. The Food and Drug Administration and health officials throughout the country are to be congratulated on the rapidity with which they have traced all shipments of this nefarious mixture.

Mention of this incident suggests sulfanilamide as the most important single drug for discussion here. This substance has an interesting history in that it throws light on the practices that are perhaps not unknown in this country. The first reports of sulfanilamide were clinical ones made in 1933. The first experimental evidence that this substance was effective against streptococcal infections in mice was published in 1935, and the dosage then reported was not even remotely adequate according to later experiments. The chemical as originally introduced was complicated, and was protected by patent. To Marshall* belongs the credit of seeing immediately that the active agent which is split off from the compound in the body is a comparatively simple substance, sulfanilamide; it was first made in 1903 and consequently is not patentable. This rapidly supplanted Prontosil and Prontylin.

The introduction of this substance as a therapeutic agent illustrates another point where pharmacological advice is of value to the health officer. If his function is to advise the physicians of his district about new drugs, he can often secure information of possible dangers before clinical examples are recorded. In the case of sulfanilamide, there was a strong indication from the chemical structure of the drug that hemolytic effects should be guarded against, and likewise that granulocytopenia was a possible toxic manifestation. Changes in the hemoglobin were suspected as possible complications of its use. All these predictions by those familiar with the relation between physiologic action and chemical constitution have been borne out by subsequent events. It is interesting that some change in the color of the blood, the cause of which is not wholly clear, is an accompaniment

*Personal communication.

of adequate treatment. A new drug falls into disrepute, often undeserved, because of inadequate dosage, improper administration or use in improper cases. Briefly, at the present time, the indication for the use of this drug is in infections with the hemolytic streptococcus, the meningococcus and the gonococcus, and possibly in Type III pneumonia. It is common to find that it is tried, usually in inadequate doses, for all sorts of conditions which bear no relation to its now fairly well-established effectiveness.

As to the method of administration in adults, sulfanilamide should be given in divided doses totaling 3 to 5 gm. per day, preferably with an equal amount of alkali, or somewhat less, in the form of sodium bicarbonate, to avoid depletion of fixed base. Because of its activity in an alkaline medium it may be found to have some use as a urinary antiseptic in cases in which it is difficult to change the reaction of the urine to the acid side, and in certain types of urinary infection. It is apparently valueless against ordinary urinary infection with the colon group of organisms, which may be effectively treated with another newly introduced drug, the ammonium salt of mandelic acid. A definite public-health problem is involved in the use of sulfanilamide in the treatment of gonorrhea. With our lax laws it will unquestionably be sold freely for self-medication. It is conceivable that inadequate self-treatment may cause a tremendous spread of this disease. Certain symptoms associated with the administration of the drug may simulate mild alcoholic intoxication in ambulatory patients and thus provide a public menace in relation to the automobile.

Elixir of Sulfanilamide was produced by the S. E. Massengill Co., a pharmaceutical concern in Tennessee. The sulfanilamide was dissolved in diethylene glycol, and the results of its use provide a better experiment in toxicity than is usually seen in pharmacological laboratories, the recorded deaths constituting 100 per cent of those taking the mixture. The marketing of this preparation was absolutely indefensible, since it was shown in 1930 that the toxicity of diethylene glycol was approximately that of wood alcohol. Apparently, this mixture was distributed for sale not only without being tested but without even a casual investigation of the literature on the part of its makers. This ghastly experience indicates the danger of combining drugs in therapy without adequate pharmacological control of the mixtures, and the crying need for adequate legislation to control the marketing of all medicinal substances. Under the present law the only liability of this firm lies in connection with the use of the word "Elixir," which is defined as an alcoholic solution. In other words, the firm cannot be indicted for manslaughter but only for misbranding.

Owing to limitations of time, I can do no more than touch on certain other drugs of particular interest to public-health authorities. In the malarial field, Atebrine, an acridine derivative, is valuable in destroying the asexual forms of the parasite. However, disturbing mental manifestations have followed its use. Plasmoquin, more closely related to quinine, has also been introduced as a complementary substance since it destroys the sexual forms. The use of ammonium salts of mandelic acid in pyelitis has proved very effective against the colon-typhoid group of organisms. Here again we must follow strictly the directions in the administration of this drug in order to get the results which have been obtained in the best hands.

It would not be satisfactory to conclude this brief survey without mentioning the pentavalent arsenicals such as Tryparsamide, Bayer 205 and Fourneau 309. These were introduced against African sleeping sickness and would appear to be of little use in Boston but Tryparsamide has been found very effective against syphilis of the central nervous system, and since the Commonwealth of Massachusetts manufactures and furnishes arsphenamine, it may be that a compound similar to Tryparsamide may some day be distributed by the State.

Two other arsenicals of considerable importance to public health have recently appeared. Stovarsal, originally used for the treatment of amebic dysentery, is said to be valuable in the treatment of Vincent's angina. This disease presents a definite public-health problem, spreading largely through restaurants. Here is a distinct field for public-health authorities, in conjunction with pharmacologists, bacteriologists and clinicians, to investigate a substance that appears to be effective in a condition which is widespread and a source of economic loss.

A similar compound of arsenic, Carbarsone, has been found sufficiently effective in amebic dysentery to merit a place with emetine. This disease, since the epidemic occurring at the time of the Chicago World's Fair, has become a problem of public health all over the country. Three other substances, Chiniofon, Vioform and Yatren, all chemically related to quinine, have also been introduced to combat amebic dysentery. The relative value of all these drugs is under discussion at present, and this attempt at evaluation should include the active participation of health departments with pharmacologists and clinicians, in order that the spread of this disease may be halted by adequate therapy.

I have given enough concrete examples to indicate the points at which the health officer meets

the science of pharmacology. It becomes obvious that the training of the health officer should emphasize this field to a sufficient degree to make him alert to its possibilities, in order that he may promptly seek advice on the many problems which may affect the public health. The health officer should preach constantly of the evils and dangers of self-medication and of the improper use of good drugs by physicians. Sulfanilamide provides an excellent example of the possible dangers of new drugs. It is almost certain that we have in this drug an addition to therapeutics which is of epochal importance, but at the very outset those familiar with the pharmacological literature were able to predict the probability of untoward blood reactions. New remedies introduced by substandard pharmaceutical houses should be carefully scrutinized. District health officers should have readily available adequate directions for the use of new drugs, so that they may serve as a source of information for physicians in their districts, in the same way that they now see to it that the physician makes proper use of the various serums. Finally, distribution by the State of certain important drugs should be studied, if only as a threat to check the exploitation of the lay and medical public by unscrupulous manufacturers.

Let each of you preach to the public, to the legislators, to the manufacturer and to the practicing physician in season and out of season the necessity for the complete elimination of all proprietary, copyrighted names for medicaments and of all patent medicines. The control of this traffic *is* a function of government and of all interested in the health of the people. Education in this direction will ultimately by democratic processes force adequate food and drug legislation, eliminate these abuses, and reduce the cost of medical care.

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THE MEDICOLEGAL EXAMINATION OF HAIRS

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THE examination of hairs and other fibers is an important procedure in criminologic investigation, and deserves serious attention. In an appreciable number of criminal cases, human or animal hairs are a part of the corpus delicti, so that it may be necessary to examine them and appraise their significance as evidence. It is my purpose here to discuss the value of such hair examinations and also to point out their limitations.

A preliminary consideration of the normal hair growth is necessary before entering on this discussion. Hair is a specialized epithelial outgrowth of the skin which occurs everywhere on the human body except on the palms of the hands and the soles of the feet. The portion embedded in the skin is termed the root and that above the surface is known as the shaft; the distal end of an uncut hair shaft ends in a point, but if the tip of the hair has been cut, this end may be blunt, rounded or frayed. In their normal habitat, hairs are continually growing, reaching maturity and falling out, and new hairs are taking their places. In the same scalp, hairs in different stages of development are found side by side and show variations in length, thickness, shape and degree of pigmentation.

The most distinctive part of the hair is the shaft, which consists of cuticula, cortex and medulla. The cuticula is the outermost covering and consists of one layer of non-nucleated polygonal cells which overlap like the scales on a fish; the free edges of the cells are directed toward the distal end of the hair. If a light-colored hair is examined microscopically in the dry state, the fine, wavy borders of the cuticula become visible. On human hairs, these markings appear as transversely elongated, polygonal figures which are said by some to be narrower than the cuticular markings on the hair of other animals. They have been suggested as an important criterion in hair diagnosis, but in my opinion are not satisfactory for that purpose, as the differences between the cuticular markings in the various mammalian species are not clearly defined.

The most characteristic portions of the hair are the cortex and the medulla. The cortex is the intermediate and the thickest layer of the shaft, and is composed of elongated, spindle-shaped fibrils which cohere; they contain pigment granules in varying proportions depending on the type of hair. The medulla is the central canal of the hair; it may be empty or may contain various sorts of cells, more or less pigmented. Examination of the cortex and medulla yields the most reliable criteria in the diagnosis of hairs.

A systematic procedure should be followed in all hair examinations which have medicolegal importance. The person who brings the specimens to the examiner should identify them to him, and a

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record should be kept of the date, place and hour of this identification. If the case under consideration ever comes to trial, the evidence cannot be presented unless the hairs can be properly identified.

The next step is to examine the specimen with the naked eye or with a hand lens. The number of fibers should be noted and their length should be determined by actual measurements. When specimens contain a large number of fibers, the examiner should measure a sufficient number to determine their average length. The color, texture and other characteristics should be noted, and also any abnormalities which may be present.

The hairs should then be examined under a microscope in the dry state. If the strands are lightly pigmented, the cuticular markings are as a rule visible, and their character may be noted. The nature of any foreign substance which may be adherent to the hair shaft should be determined.

After this, the hairs should be cleaned with alcohol or some other solvent and mounted on a slide in xylol balsam. The nature of the specimen will determine the way in which this should be done, but a set of rules cannot be devised to meet the problems set by every conceivable case. However, the mount must be so prepared that the distal and the proximal ends of the hair can be examined, and the general shape, thickness and characteristics can be ascertained without difficulty. The diameter of the shaft may be measured with a micrometer eyepiece, but I agree with Glaister[1] that the importance of such measurements can be overrated, inasmuch as the diameter varies considerably not only in different hairs in the same scalp but at different locations on the same hair. More reliable information can be obtained by comparing the hairs in the specimen with other human hairs in a collection.

Cross sections of hair are especially valuable and should if possible be made of every specimen, except in cases in which it is more desirable to preserve the whole mount intact. The most useful technic for this purpose is to wash the specimen in 95 per cent alcohol for five or ten minutes, to steep in a 10 per cent aqueous solution of sodium hydroxide until the hair is softened sufficiently, to wash in water a few minutes, and to place in 95 per cent alcohol for ten minutes. The length of time in which the hair should be softened by the sodium hydroxide must be determined by the experience of the examiner, but generally when the hairs show signs of losing their natural elasticity they should be removed from the alkaline solution. The hairs are now mounted for sectioning on a small cubical block of liver tissue which has been kept in acetone. A small slit is made in the cube of liver along the length of one side, and the hairs are straightened out in the bed of this incision. The liver and the hairs are transferred to clove oil and allowed to clear; they are then embedded for twenty-four or forty-eight hours in celloidin which has been dissolved in equal parts of absolute alcohol and ether. The cube of liver tissue is placed on a wooden block in such a way that the slit and the hairs stand upright, and is then hardened for thirty minutes in a bath of chloroform. Cross sections of the liver and the hairs are made by the sliding microtome, and the sections are cleared in carbol-xylol and mounted unstained on a slide in xylol balsam.

Examination of such hair sections will determine the shape of the shaft in cross section, the relative size of the cortex and medulla, and the character and distribution of the pigment in the cortex. This procedure has the advantage of allowing several individual hairs to be examined in the same microscopic field. It is even possible to examine the same hair in whole mount and cross section by removing a piece from the whole-mount slide after the examination and sectioning by the process described above. A valuable method for comparing whole mounts or cross sections of hair is to join two similar microscopes with a comparison eyepiece and examine the specimens in the same ocular field. Photographs can be taken of the different specimens at the same magnification, which is an excellent and convenient method of demonstrating similarities of and differences between hairs from several sources.

An attempt should be made to answer the following questions in every hair examination: (1) Are the fibers hair or some other material? (2) If they are hairs, are they human or animal? (3) If they are human hairs, what is the race, sex and age and from what area of the body were they taken? (4) Is there any abnormality of the shaft, tip or root? (5) Can the hairs be identified as from a certain individual?

It is a comparatively simple matter to distinguish between hairs and other fibers which might be mistaken for them, such as cotton, wool, silk or straw fibers. All these materials present characteristic appearances of their own under the microscope, and any observer who is familiar with hair is not likely to confuse it with fibers of other types.

Animal hairs in most instances can be distinguished from human hairs if typical specimens of each kind are available for comparison. The diagnostic features are most suitably demonstrated by cross section, especially when dealing with dark hairs. When cut in this plane, human hairs present a circular, ovoid or almost flat outline. The medulla is smaller in comparison with the thick-

ness of the shaft than in any of the other animal species, and is not always present. The pigment granules are distributed mostly near the periphery of the cortex. In contrast, animal hairs present a great variety of shapes; in most species they appear circular or oval on cross section, but they may have a bizarre shape like a knuckle bone, as in the rabbit family; the medulla is large in proportion to the diameter, and usually extends almost the length of the hair, while the pigment in the cortex is concentrated mostly around the medullary canal. Large tail hairs of some animals may have a small medulla, but the amount and type of pigmentation forbid the possibility of an erroneous diagnosis. If only a small fragment is available for examination, it might be possible to mistake as human the light-colored hair of a domesticated animal taken from near the pelt where the medulla is often absent; but if a length of the shaft which includes the medulla is present, its identification will probably not be difficult.

If a specimen of hair from an unknown person is presented to the examiner for diagnosis, it is possible in some cases to determine the part of the body from which it came and the race, sex and age of the individual. However, it is easy to arrive at erroneous conclusions on these points, and the examiner should hesitate to express an opinion unless the evidence at his disposal is reliable.

The main divisions of the human race present quite distinct differences in their scalp hair. The Chinese and similar races possess straight, dark hair with a large, rounded shaft. The Negro as a rule has dark kinky hair, with an ovoid, almost flat shaft on cross section, which alternately decreases and increases in thickness along the course of the hair. The white race possesses hair either straight or curly, usually circular or ovoid on cross section and showing pigmentation which varies from blond to dark brown. Many hybrid individuals exist, however, and their hairs may show all intermediate gradations between the different racial types.

It may be possible to determine by an examination of hairs whether they were taken from a man or woman. As a rule the hairs of the latter are thinner, softer and less wiry than those of the former, but as considerable variations in these qualities are presented by both sexes, such criteria could not be applied to an individual case. The chief differences in human hair as regards sex are those which are artificially produced as a result of custom, such as allowing the scalp hairs of women to grow long and keeping the hair of men and boys cut short. In recent years, the custom of bobbing the hair of women has made it a matter of some difficulty to distinguish between the scalp hairs of the sexes. The hairs of the face normally show the greatest difference, for in the male they are frequently thick and coarse but in the female are thin and downy. On the other hand, women who are suffering from an adrenal tumor may show a stiff and wiry beard, along with other signs of virilism.

Age differences occur especially in scalp hairs. In infancy the hair is fine and light in color, and rarely shows a medullary canal. As the individual passes through childhood and adolescence to adult life the hairs increase in size and depth of pigmentation and a large proportion possess a medulla. About the fourth decade, the scalp hairs show a tendency to lose their pigmentation and more and more gray ones appear. Many interesting microscopic variations are found in such hairs when the graying process is under way. There is, however, so much individual variation in the rapidity and degree of these changes during growth and senescence that it would be a matter of some difficulty to determine the age of an individual from a sample of his hair.

Hairs from different parts of the body present distinguishing characteristics. The variations in scalp hairs have already been described; in addition they are usually longer than hairs from other regions, and may show signs of having been barbered or brushed. Hairs from the eyebrows, eyelashes and nasal apertures are short, are usually broad at the base but come rapidly to a point, and generally possess a medulla which is continuous throughout their length. Hairs from the pubis, axilla, chest and abdomen are wavy and curly, with alternate zones of contraction and enlargement along their length; the pubic hairs on the average are larger than the others. On the arms and legs the hairs are similar but smaller than those on the chest or abdomen. The beard in men consists of thick, curly hairs, ovoid, rounded or square on cross section, and larger than most other hairs on the body. Many fine hairs found on the face and other parts of the body may be almost microscopic in size and possess an interrupted medulla or none at all; these minute structures show definite pigmentation in dark-haired individuals but are only slightly pigmented in light-haired persons. In many cases it is possible to form an opinion from the examination as to which part of the body was the source of a certain hair, but caution is necessary.

Hairs should be examined to see if they present any unusual features or have received any unusual treatment. Microscopic examination of the root end may reveal a rounded, club-like appearance if the hair has fallen out, or a distorted and

twisted extremity if it has been pulled out forcibly while firmly attached to its bed. If the distal extremity is observed under the microscope, one may determine if it ends in a point, or shows the flat slightly rounded surface characteristic of a cut, or the bubbles produced by flame, or a frayed extremity due to trauma or brushing. Microscopic examination will also reveal that the hair has been dyed or bleached, and occasionally there will be a line of demarcation between the treated and untreated portion of the shaft.

The identification of a specimen of hair as having been derived from a certain individual is always difficult and in most cases impossible. If a number of strands are taken from a known source and compared with another specimen, it is impossible to say with absolute certainty that they are identical in origin, no matter how similar they may be in appearance, both grossly and under the microscope. Many individuals have hair which would present the same characteristics on examination and could not be differentiated. Recently I tested the reliability of such identification by taking several specimens of brown hair of the same shade from different individuals, and comparing them with a group of undesignated specimens, some of which came from the same sources as the originals while some did not; an attempt was made to select from the undesignated group the specimens which were identical in origin with the first group, but I was able to do this correctly with but 50 per cent of the specimens. It can be stated with certainty that the criteria available in hair examination are too few and too ill-defined to make this procedure a reliable method of identification; in other words, hair examinations should never be used in the way in which fingerprints are employed. On the other hand, it is possible to detect such dissimilarity between two specimens of hair that the opinion is justified that they could not possibly be derived from the same source. All these points have a distinct medicolegal application.

MEDICOLEGAL CONSIDERATIONS

Most specimens of hair which have been submitted to me for examination have been found in connection with some death by violent means. A large number have been taken from blunt instruments or from automobiles suspected of having caused death (Fig. 1). The problems which they have presented may be divided into the following categories: (1) whether or not the hair had received unusual treatment; (2) the nature of a hair on a blunt instrument; (3) the comparison of the hair in a victim's hand with hair from a defendant.

In one case of manual strangulation during which there had been a struggle, a tangled mass of long hair was found and examined to determine whether or not it had been pulled forcibly from the head. The root ends of most of the hairs were twisted and deformed, and it was evident that they had been torn out with appreciable violence.

Fibers from a blunt instrument are sometimes sent in for the purpose of determining their nature, especially whether or not they are human hairs. In one such case, a fine fiber embedded in the rust on the handle of an automatic pistol was seen when examined to be a minute human hair of light

A *B*

Figure 1. *A. Hairs from scalp of deceased. B. Hairs from door of automobile. Note the similarity in outline and type of pigmentation as seen in cross section.*

color, with a fine interrupted medulla of the same type as the fine hairs on the face. There was a strongly positive test for blood in the material around this hair. The defendant confessed that he had struck the deceased, a blond woman, with the handle of his pistol. Later he repudiated his confession, but at the trial testimony regarding the hair was a link in the chain of circumstantial evidence connecting him and his gun with the scene of the crime.

Fingernail scrapings occasionally contain a few hairs and other objects of importance amid a heterogeneous collection of such material as wool fibers, cotton fibers, fragments of felt and grains of sand. In one case, two minute hair bulbs with shaven distal ends, apparently from the chin of a man, were found in the fingernail scrapings of a woman who had been killed by manual strangulation. In another case a small piece of pigmented epidermis was recovered from the fingernails of a woman who had been killed by a Negro during the commission of a robbery; the defendant had scratches on one arm which might have been the source of the specimen. In most instances, objects recovered from the nails are more important as clues than as legal evidence.

The cases which present the most difficult problems are those requiring a comparison of hairs found in a victim's hand with the hairs of a defendant for the purpose of proving identity or non-

identity. In one such case, a woman of advanced years held in her hands a tangle of gray hair which probably came from her own head, and a single light brown hair which was certainly not her own. The hair of the defendant was similar to the single light brown hair, but the limitations of the examination would not permit any positive statement to the effect that they must have had an identical source. The other evidence in the case was convincing, however, and the prosecuting attorney was able to propound a hypothetical question which limited those at the scene of the crime to the deceased and the defendant. Under such conditions it could be stated with reasonable certainty that the brown hair in the hand of the deceased came from the head of the defendant because of its similarity, and did not come from the head of the deceased because of its dissimilarity.

* * *

In general, the evidence which results from hair examinations must be regarded as confirmatory, and should never be used unsupported by other proof. The circumstances in each individual case must determine how valid will be the facts elicited from the hair examination.

The most fitting person to perform examinations on hair is a medical graduate or a biologist of wide experience. The study of hair is a specialized branch of histology, and of such complexity that long and painstaking application is required to master it. It is important that the scientist engaged in this pursuit should prepare numerous specimens of human and animal hairs, both in whole mount and in cross section, and should make photomicrographs of the most typical specimens for the purpose of ready comparison.

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PROGRESS IN DIABETES MELLITUS

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IN this article, it is our purpose to summarize the literature which has appeared since the review in the sixth edition of Joslin's *Treatment of Diabetes Mellitus* (Lea & Febiger, 1937) and in Chapter V of *Nelson Loose-Leaf Living Medicine* (Thomas Nelson & Sons, 1937).

INCIDENCE AND MORTALITY RATES

The number of persons with diabetes in the United States is growing. This can be explained first by the increasing duration of life of the diabetic, which is perhaps the greatest factor; secondly, by the steady and rapid lengthening of life of the total population, the age at death being 41.9 years in 1920 and 48.7 years in 1930, thus approaching the ages of maximum susceptibility to diabetes, fifty-one for males and fifty-five for females; and thirdly by the wider recognition of the disease. Urban rather than rural life, greater availability of food and reduction in physical exercise are more doubtful factors. Evidence from two other sources indicates that there are more living diabetics about us today than ever before; that is, there has been a marked increase in the sale of insulin and of syringes, particularly those designed for diabetics. The estimate of the Metropolitan Life Insurance Company and the authors early this year was that there were between 400,000 and 500,000 individuals in the United States with diabetes; but all will agree that until new methods for the prevention of the disease are known these figures will rise.

The proportion of new diabetics to total admissions to hospitals is cited as proof of this increase. Such reasoning is not wholly logical unless one takes into account the decrease in contagious cases and in diseases more frequent years ago, balances with it the increasing tendency of patients to enter hospitals for diabetic schooling rather than for disabling illness, and bears in mind that two decades ago the patient lived only four or five years and now lives twelve or more, and so has six or seven more years in which to be counted as an admission to one or more hospitals.

Diabetic mortality figures show increases both absolute and relative. The figures per 100,000 for the United States changed from 16.0 to 19.0 to 22.2 for 1920, 1930 and 1935, respectively. However, as indicative of what we may expect in the future, we cite Hoffman's rates of 21.4 per 100,000 for 184 selected American cities in 1930 and 27.8 for 187 cities in 1936. The rate for the five largest cities in 1936 was 31.2, for Boston in 1935 it was 35.0, and for New York City in 1936 it was 34.9. In four-

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teen Canadian cities in 1936 the average rate was 16.0, as compared with 13.3 in the Canadian registration area in 1935. Just as one can predict that the death rate of the country will approach that of the larger cities, so too can one feel confident that the rate in other countries will approach that in the United States. In fact, this change is proceeding most rapidly where the original rates were lowest. Italy as a country and Saskatchewan as a province of Canada show this equally well, as pointed out by Chase. She also finds that the distribution by decades of onset of the disease in Saskatchewan among her private cases is essentially the same as in New England among the authors' clientele, thus showing independence of environment. She reports that no case of diabetes was ever found among 1500 Indians whose urines were examined, and that the Inspector of Indian Affairs in Saskatchewan has never heard of a case of diabetes in a pure-blooded Indian. Teleky also has recently shown that the diabetic mortality rate for women in Prussia rose from 0.74 in 1877 to 8.1 in 1914 and to 19.2 in 1932. No doctor can afford to neglect serious study of the diabetic problem, because there are so many diabetics and they live so long.

Hoffman writes, "It is regrettable that diabetes is not a notifiable disease and that the number of diabetics in this country is only a scientific conjecture." We disagree with this opinion, if for no other reason than that the diagnosis of diabetes is sometimes difficult, especially for immediate decision.

Bolduan believes the low mortality in New York City in 1871-75 — 2.0 per 100,000 — was due more to the non-recognition of the disease than to its rarity, and recalls that chemical tests for sugar in the urine were not introduced until 1850 and were not routinely adopted until some decades later. That the rate for females was formerly low he attributes to the detection of diabetes in males through life-insurance examinations, this factor offsetting the actual greater prevalence among females which existed then as now. In this connection, Teleky records the extraordinary mortality rate of 1060 per 100,000 for females between sixty and seventy years of age in Prussia in 1931. We may expect the increase among females to continue for some time, Bolduan says, until the rate becomes stabilized at a point which represents approximately the relative prevalence of the disease among the two sexes; he adds that the forty-five-years-and-over group is more than one-third greater than it was in 1900. Since 1900, at least one third of the increase Bolduan believes to be attributable to the aging of the population. Part of the increase is due to the influx of Jews, in whom he says the disease is 50 to 75 per cent more prevalent. Allowing for these two factors, age and race, "the diabetes mortality rate in New York City among males shows a downward trend during recent years." He considers that 1 per cent of the population of New York City is diabetic and that "it is probably conservative to estimate the diabetics in the United States as over 600,000."

> Despite the prevalence of diabetes [he writes], we do not find this disease among the five leading causes of death [in New York City] among males at any age period. It appears in eighth place in the age period 50-55, and does not rank higher than seventh after this. In females, on the other hand, diabetes is among the five leading causes of death at ages 55-64 years, and, after occupying eighth place at ages 40-44, it is never less than sixth place in the more advanced years.

In a recent publication from Washington, the frequency of ten leading diseases in poverty is mentioned, but of them, diabetes is the exception in that it did not progress with the extent of the poverty.

In 1935 diabetes mellitus was responsible for 3 per cent of all deaths of holders of industrial policies of the Metropolitan Life Insurance Company according to a recent report. It ranked ninth among the causes of death in this group, and if accidents and homicides are excluded, it ranked eighth. In recent years (1931-1935) the rate under ten years of age has been less than 2.0 per 100,000, rising to 142.2 for both sexes among white persons between sixty-five and seventy-four and to 305.2 for white women. The rates among Negroes have been less and the increases more rapid. The rate among white women, aged one to seventy-four, exceeded that among the men by 91 per cent, and among Negroes by 112 per cent, but the actual excess is virtually limited to middle and old age. Negroes are as prone to the disease as are Whites, and between the ages of ten and fifty-five the rates for negro women are higher.

For the last four years, the report continues, the death rate from diabetes as a whole has been constant, the maximum for any one year being 20.8 per 100,000. Among young persons, the trend has been downward since the discovery of insulin, with the exception of young Negroes, and here there has been a rise, as in older ages for all.

The increases are explained in part by the greater percentage of older people in the population; thus, between 1900 and 1930 the population at forty-five years or over more than doubled, but the total population grew by only 62 per cent. The female population at forty-five and over has advanced 110 per cent in thirty years. The shift of population from rural to urban centers, and the rapid growth of foreign immigration, including peoples peculiarly susceptible to the disease, have had as results a growing population susceptible to diabetes. The increase in the use of machines, which reduces muscular work, and the rise in the standard of living, are accessory factors, presumably because they

favor obesity. Also of great importance has been improved diagnostic technic. The growth of life insurance has naturally contributed to the discovery of new cases, for 4,000,000 persons in the last few years have annually applied for such insurance, requiring medical examinations, and the number thus insured is now about 30,000,000. Other points brought out are the growing longevity of diabetics especially of children, the reduction in the mortality due to diabetic coma and the shifting of causes of death to conditions incident to the age of the patients.

INSULIN

The use of protamine insulin has become widespread in the United States, largely because of the simplicity and ease of single dosage, making it advantageous not only in children but also in adult patients with milder grades of the disease. In general, those clinicians who have employed it extensively are most convinced of its value. Protamine-zinc insulin is the type authorized for sale and has displaced the original protamine insulin and its various other modifications. Patients hitherto untreated with insulin adopt its use most readily and seldom have difficulties, whether hospitalized or treated in the office. For patients brought up on regular insulin, the transfer to protamine insulin is often confusing, and for those whose meals must vary in time and quantity from day to day it may be impracticable.

Protamine-zinc insulin may act not only for twenty-four hours but in fasting patients for forty-eight hours or longer (Wilder; Sprague and Rynearson). Consequently the action cannot be expected to meet uneven demands such as the peak loads of meals. Similarly, its action is just as strong between meals when the glycogen reserves are lower. Therefore, for successful therapy meals must be spread far apart and luncheons inserted between them and particularly upon retiring, to guard against the night's fast; sometimes, indeed, it is safest to begin the day with the breakfast fruit and protamine insulin simultaneously. Contrasted to the procedure with regular insulin, in which the dose may easily be varied with the immediate needs, with protamine insulin the dose preferably remains unchanged but the carbohydrate may be shifted, as recommended by Ricketts, from one meal to another or the total carbohydrate for the entire day may be raised or lowered. Occasionally such alterations do not suffice and one is compelled to supplement the dose of protamine insulin before breakfast with regular insulin, the dose of the latter varying as a rule from one fifth to three fifths of that of the former. Seldom is the total dose of protamine insulin less than that of regular insulin which the patient may have been using.

Hypoglycemia. Reactions to protamine insulin are, as a rule, less severe than is the case with regular insulin. They are usually accompanied by fatigue, nausea and headache along with the typical hypoglycemic symptoms, although the perspiration, tremor and palpitation are less marked. The patient may appear in a semi-dazed state with mental processes depressed. The hypoglycemia at times is asymptomatic, but may lead to marked and severe symptoms if, at such a period, the patient exercises. Symptoms may come on more unobtrusively than those due to regular insulin. At times the patient requires more than one dose of carbohydrate to secure relief.

"With protamine zinc insulin," says Sherrill, "the blood sugars may be maintained at very low levels, namely 0.03 per cent and 0.04 per cent, without symptoms of any kind." Attention is called to the recent experiments of Sherrill and MacKay, in which they report as follows:

> Normal dogs die following prolonged hypoglycemia from a single or several injections of protamine-zinc insulin. Heretofore it has been generally assumed and recognized that the hypoglycemia resulting from the use of regular insulin has proved entirely harmless if the blood sugar is returned to normal by the administration of carbohydrate or other food. No deleterious, residual injuries have been noted in man or animals. We have found that when fasted dogs are kept in hypoglycemic shock with occasional convulsions for twenty-four hours or more, some organic change is induced which prevents recovery and results in death, even though the blood-sugar level is restored to normal and the fluid balance is adequate. We have used 6 normal dogs for experiments and death has resulted in each instance. As a rule, we have given a single injection of approximately a half unit of protamine insulin per pound of body weight. Subsequent smaller doses may be required to produce prolonged hypoglycemia. These dogs have been kept in a stuporous or comatose condition with blood-sugar concentrations ranging from 20 to 30 mg. per 100 cc. for from twenty-four to forty-eight hours. Carbohydrate was then administered either intravenously or by stomach tube and the blood-sugar concentration raised to normal until death ensued. None of the animals regained consciousness. Some tissue or organ is apparently so damaged by the hypoglycemia or related reduction in glycogen content that death ensues, probably due to failure of the vascular system. No gross pathological lesions in the visceral organs or brain have been noted. Further experiments are in progress to determine the mechanism of this deleterious effect of insulin shock and the minimum duration of hypoglycemia which is dangerous.
>
> As to whether the pathological lesions or chemical alterations which cause death in the dog are similar to and can be reduplicated in man is open to question. Nevertheless, admonition at this time is expedient. . . . Although the above animal experiments are convincing, hasty, adverse conclusions should not be arrived upon which might deprive the diabetic patient of the benefits which might accrue from protamine insulin.

Wilder's experiments with dogs given overdoses of protamine insulin resulted similarly. Multiple

petechial hemorrhages were found in the brain.

In the course of studies designed to determine the effects of various diets, hydration, dehydration, and so forth, on convulsions caused by insulin in nondiabetic dogs, Corwin found that if an animal was given injections of insulin on successive days, its resistance to hypoglycemia decreased on the second day and decreased still further on the third. The resistance then became more or less stabilized so that on all succeeding days there was little if any variation in the response.

For clinical reasons Jordan emphasizes the importance of caution to avoid hypoglycemia in elderly diabetic patients who are taking insulin.

A diabetic who has an insulin reaction which puts in jeopardy the lives of others or his own, makes it increasingly difficult for diabetics to secure employment, and brings nearer the day when the privilege of driving a motor will involve stricter physical and mental tests. Diabetics must not have insulin reactions, and this is one reason why we are satisfied if we can keep our severer diabetics 90 per cent instead of 100 per cent controlled. By this we mean that there is excreted in the urine no more glucose than 10 per cent of the actual carbohydrate in the diet. For this purpose the formation of glucose out of protein and fat can be disregarded. This paragraph is written apropos of the opinion of the New York judge who discharged a diabetic where the evidence showed he was having an insulin reaction at the time of the accident, but who, on the other hand, took away his license.

Sensitization. Swelling and induration at the site of injection of insulin may occur and threaten abscess formation, but the latter seldom if ever develops. After a few weeks these local signs almost invariably disappear, and with the continuation of injections new ones fail to form.

Lewis points out that insulin protein is an active antigen and does not react in common with pancreas protein; that its specificity is independent of that of the major constituents of the pancreas; that it is without species specificity since it has no antigenic activity in common with other proteins of the same species, which are strongly species specific; and finally that insulin proteins from different animal sources are immunologically closely related.

Protein sensitiveness so severe as to prevent the use of insulin has been extremely rare in Umber's clinical experience with 8000 diabetics. Generally, sufficient prophylaxis is given by injecting 4 units twenty minutes before the regular insulin injection. Stötter, from Umber's Clinic, thinks that if he had used the method of Lasch and begun with a dilution of 1:100, the result would have been fatal in his patient, who had a history of protein sensitivity and hay fever in 1916, and sensitivity to peptone in 1919. An attempt at desensitization almost caused death. In 1931 diabetes was diagnosed; in 1932, following the administration of staphylococcal autovaccine, the patient had an allergic reaction of extraordinary severity, the blood on the next day showing 6,600,000 red cells and 9 per cent eosinophils; in 1933 there were two more reactions to peptone. The patient entered the Umber Clinic in July, 1936, with a urinary excretion of 66 gm. of sugar in twenty-four hours and a blood sugar of 280 mg. per cent. Desensitization was begun with intracutaneous doses of 0.1 cc. of a 1:1,000,000 dilution, but the reaction proving positive, with marked local and later general symptoms, the dilution was changed to 1:10,000,000,000 and was gradually increased. The patient was kept on a protein-free diet for about a month. Within one month he could take 0.5 cc. of a 1:1000 dilution. After two months the diabetes was controlled with 12 units twice daily. Special precautions were taken to preserve the crystalline insulin used, to keep it free from contaminating protein. Eventually the patient was wholly desensitized against insulin, and incidentally, peptone sensitiveness also disappeared.

Methods. A multitude of articles upon protamine-zinc or calcium insulin has appeared. Joslin summarized and commented upon his results in over 1250 cases. Emphasis was laid upon the desirability of reverting to the Naunyn era and comparing carbohydrate intake with glucose loss. If with modern diets containing 150 gm. of carbohydrate only 10 per cent, or 15 gm., appears in the urine, the case can be considered fairly well controlled. With complete sugar freedom, there is danger of reactions unless the days are planned with remarkable uniformity. The zeal of patients to keep sugar-free throughout the twenty-four hours, however, is a welcome contrast to their former indifference to their tests.

Wilder demonstrated the importance of insulin in protecting the proteins of the body from catalysis. This may account for the better health and apparent increase in carbohydrate tolerance of patients taking protamine insulin. Wilder also found an initial dose of protamine insulin along with regular insulin of decided value in the treatment of diabetic acidosis.

Most writers, including Sherrill, stress the better control of patients under protamine insulin and its value in reducing hepatomegaly. Greenhouse also noted improved carbohydrate tolerance, which he quite correctly writes "may be ascribed to the stabilized carbohydrate metabolism made possible by the continued insulin effect maintained by protamine zinc insulin." Richardson gives good working rules for its employment.

Himsworth finds that the new protamine insulin compounds act so slowly that they are ineffec-

tive in suppressing alimentary hyperglycemia, and that it is therefore often necessary to give auxiliary injections of quickly acting insulin.

Evidently Whitehill and Harrop have realized the difficulties of protamine insulin for the careless or erratic diabetic, for they write: "Individuals with moderately severe diabetes who will not submit to a careful, regular dietary regime will find the use of regular insulin safer and, on the whole, more satisfactory." They also note the variability and unpredictability of its action. Gray, Bischoff and Sansum report favorable results with histone insulin, which because of its slow and prolonged action they consider particularly useful in patients with severe diabetes, in juvenile patients and in elderly ones with cardiovascular complications. No local or systemic reactions were noted. The total unit requirement was the same or less than that with regular insulin. Instead of 2.7 injections per day of regular insulin, the number has been reduced to 1.2 injections of histone insulin.

With children especially, says Joslin, protamine-zinc insulin has been welcomed, although with the large majority, regular insulin has also been necessary. Newcomb, Dick and Schnute urge the importance of adjusting the meals and carbohydrate intake so as to prevent reactions when children are taken home from the hospital. Children were said to have fewer periods of intense hunger than adults and to be more active and alert. Favorable results with children were noted also by Drysdale, who believes protamine insulin especially efficacious in preventing diabetic acidosis in juvenile diabetic patients suffering from respiratory infection.

According to Sindoni, "protamine insulin, if indicated, should be given on retiring and, if necessary, after breakfast, immediately following the ordinary insulin, which is given within from fifteen to twenty minutes after meals."

Resistance. From time to time, cases have been reported which have shown most of the symptoms and signs of diabetes but which did not respond to insulin in the usual fashion. An extraordinary case treated by Mason and Sly was that of a white boy, twenty-five months old, who was found routinely to have low fasting blood-sugar values and who exhibited glycosuria and an abnormal rise in blood sugar following the ingestion of dextrose-containing carbohydrate. The ingestion of isocaloric amounts of levulose or galactose, or large amounts of protein or fat, caused much less rise in blood sugar and little or no glycosuria. The patient exhibited little or no response to insulin. The glycosuria could always be stopped by the substitution of levulose or galactose for dextrose in the diet. The authors suggest that the difficulty in this case was caused by a marked lessening of the liver's ability to convert dextrose to glycogen or to an intermediary product in this conversion.

Himwich and Fazekas hold that resistance to insulin is developed during infections. The effects of the disease in stimulating the endocrine glands and the nervous system result in a rise in blood sugar, counteracting the effects of insulin, whether endogenous or injected. It is the infection, not fever, that is the potent factor in the development of insulin resistance. Insulin resistance, experimentally produced by diphtheria toxin injections, results from an increased activity of the sympathetic nervous system which favors glycogenolysis. Insulin resistance does not appear to be due to antibodies, for antitoxin creates no insulin resistance. The mobilization of carbohydrate in response to the emergency of infection, although ordinarily a defensive reflex mechanism, becomes injurious in diabetes. Thyroxin and the anterior pituitary hormone also counteract effects of insulin. Diphtheria toxin exerts a direct necrobiotic effect on the islands of Langerhans and the cells of the liver. The chief factor in insulin resistance, however, is hormonal antagonism. Ergotartrate in large doses may inactivate the mechanism of insulin resistance. Denervation of the adrenal gland is not to be considered. Combating the infection is the most logical treatment. Standard insulin, with its more intense and rapid action, is preferable to protamine insulin in cases of acute infection.

Technical. Sahyun, Goodell and Nixon found that a preparation of insulin low in ash and free of copper, iron and zinc was unstable when incubated at 52°C. for at least one week. At the end of nine weeks' incubation at this temperature the insulin had lost 50 per cent of its physiologic activity. However, 1 mg. of zinc to every 1000 units resulted in a preparation which was quite stable at a temperature of 52°C. for seven weeks, and at the end of nine weeks' incubation at this temperature the sample had lost only 10 per cent of its physiologic activity. The addition of zinc in the amount of 1 mg. to 1000 units did not cause either a delayed onset or a greater duration of the hypoglycemic effect of the insulin.

Miscellaneous. Kantrow and Boyd gave 0.25 units of insulin per kilogram of body weight to children and determined the blood sugar before and at half-hour intervals afterward. In the nondiabetics the maximum fall in blood sugar occurred in the first half hour, whereas in diabetics the effect was prolonged.

Major and Delp found in tests carried out on both rabbits and human patients that inconstant but at times marked decreases in blood sugar might follow the cutaneous application of insulin.

HYPERINSULINISM WITH PANCREATIC TUMOR

White and Gildea report the case of a woman of thirty-two with symptoms of hyperinsulinism which were shown subsequently to be secondary to an island-cell adenoma of the pancreas. This adenoma was unusual in that it was calcified and was found outside the pancreas in the surrounding tissues. Before the operation it was noted that the patient responded more favorably to a high-carbohydrate, low-fat diet than to a low-carbohydrate regime. The threshold for the development of symptoms of hypoglycemia was not appreciably affected by the administration of large amounts of alkali or acids. No direct relation was demonstrated between emotional tension and the onset of symptoms.

Herrmann and Gius report the case of a man of forty-eight who suffered attacks of spontaneous hypoglycemia. The striking feature was that at operation instead of a pancreatic adenoma only a calcareous mass was found. No pancreatic tissue was found by the pathologist in the material removed at operation. Careful studies at intervals following the operation showed entirely different glucose-tolerance tests than before operation, and the symptoms of the hypoglycemia did not recur.

DIET

The problem of diet continues to be discussed from the point of view of the etiology of diabetes as well as from that of therapy. Bertram emphasizes the use of high-carbohydrate, low-fat diets. He, like Süsskind, believes that the increase in diabetes is due to increased consumption of fat by civilized man and to obesity itself. Of the men who were 25 per cent overweight, 49 per cent owned an automobile and therefore took little exercise, and 74 per cent were guilty of greater or less abuse of alcohol. However, in 49 per cent of his cases there was diabetes in the family. An important point is that Bertram believes that the occurrence of diabetes is not conditioned by the hereditary anlage but is in reality due to exogenous factors.

Vesa studied 23 diabetic patients between the ages of seventeen and sixty-five. Blood and urine samples were examined for sugar hourly from 8 a. m. to 8 p. m. on successive days. He found that the taking of pure olive oil did not in any case cause an elevation of the blood sugar higher than the control sugar curve obtained in fasting; in fact, in some cases the blood sugar fell during the course of the day more rapidly than during a similar period when fasting. Furthermore, the amount of sugar in the urine was often smaller when fat had been taken than when the patient had had nothing to eat.

After the taking of meat, the daily blood-sugar curve almost paralleled the fasting curve, although in some cases it was on a slightly higher level. The giving of meat did not cause any hyperglycemia; it merely caused the blood sugar to fall more slowly in some cases when compared with the fasting curve. The amount of sugar excreted in the urine after meat was somewhat greater than that during the period of fasting.

The author concludes that fat and albumin probably affect metabolism during the course of the entire day and that the ingestion of pure fat and albumin does not need to stand in any direct relation to the time of insulin medication.

The relations of the vitamins to carbohydrate tolerance must be considered of some importance since, as Umber points out, both vitamins and hormones act as catalyzing agents which regulate chemical changes in the living cell. He emphasizes the fact that one may have a purely functional disturbance in the pancreas gland of a most serious nature without any demonstrable pathologic change, not merely in relation to diabetes but in relation to the other functions of the pancreas. He illustrates this with the case of a woman of fifty-four who suffered loss of weight and fatty stools, with a loss of 75 per cent in ingested fat in the stools, development of aplastic anemia and at autopsy an entirely normal pancreas. Similarly, this condition of the pancreas can be produced in hyperthyroidism. He holds that diabetes almost never follows an infected, necrotic pancreatitis unless there is a constitutional deficiency. He cites a case, however, in which he believes that diabetes did follow some years after an acute gangrenous pancreatitis in a woman of twenty-six. He believes on clinical grounds that functional, inflammatory or neoplastic lesions in general affect only the external secretion of the pancreas. The island apparatus is extremely resistant against all exogenous pancreatic injuries unless there is a constitutional deficiency.

A direct connection between diabetes mellitus and vitamin A is unknown, according to Schroeder. Carotene, as well as vitamin A, is found in diabetic blood serum, but during diabetic coma both disappear. In view of the antagonism between vitamin A and thyroid secretion, it seems likely that carbohydrate metabolism is indirectly influenced by vitamin A. Although vitamin B has no direct effect upon blood-sugar content, he could demonstrate a slight improvement in carbohydrate tolerance by giving pure vitamin B. Lactoflavin injected intravenously reduced the blood sugar of diabetic patients by 20 to 30 per cent. Also the intravenous injection of 300 mg. cevitamic acid (vitamin C) reduced the blood sugar of normal indi-

viduals, perhaps by inhibiting the insulin antagonist, thyroxine. That vitamin D is involved is proved by the fact that ultraviolet irradiation brings about reduction of the blood and urine sugar in diabetic patients.

Stueck, Flaum and Ralli determined the serum carotene in 13 diabetic patients with clinical evidence of carotenemia and found it to be above normal in all. The average for the group was 0.39 mg. per cent. The photoelectric colorimeter was found to be a convenient and accurate instrument in the determination of carotene.

Aszodi and Mosonyi by intravenous administration of vitamins B and C caused an increased secretion of insulin in dogs' blood. In dogs without a pancreas, vitamin C caused only a slight fall of blood sugar, which presumably came from a nervous restrictive mechanism. With dogs with bilateral division of the vagus the insulin secretion was very slight or none at all, this showing a peripheral point of attack of vitamin C. Sigal and King produced in guinea pigs a lowering of carbohydrate tolerance as measured by blood-sugar content when the pigs lived on a diet low in vitamin C. This tolerance returned to normal, however, when the vitamin C was added to the diet.

Gradually, methods for quantitating vitamins are becoming more generally available. Helmer determined vitamins B (antineuritic) and G (lactoflavin) in the human urine by the rat-growth method.

CURE OF DIABETES

Glassberg presents the case histories of 5 patients in whom a diagnosis of "cured diabetes" seemed proper to him. In 4 of the 5 "cured" cases reduction in weight accompanied the increase in tolerance. One gathers that the patients did not show symptoms of diabetes mellitus but that the condition was diagnosed originally by glucose-tolerance curves. The cure was assumed because of the fact that the tolerance curve subsequently became normal. In the discussion Olmsted pointed out that diagnosis by means of tolerance curves, although at the present the only means at our disposal in addition to the evaluation of symptoms, is fraught with danger because of the fact that arbitrary standards must be maintained.

The authors of this review have never encountered a case diagnosed not only on the basis of an abnormal glucose-tolerance curve but also on that of the typical symptoms of polyuria, polydipsia, pruritus and loss of weight and strength which has subsequently failed to show diabetes. The apparent clearing up of the disease which is often seen in mild diabetic patients who have carefully followed treatment is often shown to be misleading by the intervention of some complication such as an infection with fever, during which time the diabetes once again becomes evident in full force and hyperglycemia and glycosuria reappear. We feel that the following criteria for cure still hold.

Diagnosis. The diagnosis of diabetes shall be based upon a glycosuria of 0.5 per cent or more, accompanied by a fasting blood sugar of at least 140 mg. per cent or a venous blood sugar after a meal of at least 170 mg. per cent.

Duration of Proved Diabetes. The duration of proved diabetes, by repetition of the tests described under diagnosis, shall be recorded in months. By this plan the individual can be classified as a proved diabetic of one or more months' duration. The longer the duration of the proved diabetes, the greater the importance which will be attached to its cure. Chance glycosurias and hyperglycemias resulting from errors in the laboratory, from operative procedures and from temporary infections are thus ruled out. Hyperthyroidism and hyperpituitarism are not excluded, and therefore a statement concerning these conditions should be included in the report of the case.

Test for Recovery. Glycosuria and hyperglycemia shall be absent while the patient is without diabetic medication, both before and an hour after a meal. This meal must contain at least two fifths of the carbohydrate for the day. The carbohydrate for the twenty-four hours shall comprise at least two thirds of the calories necessary to provide 30 calories per kilogram of body weight. Better still, the carbohydrate tolerance shall be unimpaired as judged by a normal glycemic curve following the oral administration of 50 to 100 gm. of glucose to the patient in the postabsorptive state.

Establishment of Recovery. A proved case of one or more months' duration, which conforms to the test for recovery at the beginning and end of an interval of five or more years, shall be considered cured.

ACIDOSIS

The hopes raised by the announcement that succinic acid might prove a valuable therapeutic agent in preventing or treating diabetic acidosis seem to have been false. Dunlop and Arnott found that this substance had no effect in preventing the onset of diabetic coma or in diminishing a chronic diabetic ketonuria. Unfavorable results have also been reported by Lawrence and by Dibold, Frey and Lapp. The latter found no effect exerted upon the acetonuria in healthy people or in diabetics. Reference should be made also to articles by Koranyi and Szent-Györgyi and by Poczka.

Deuel, Murray and Hallman conclude that succinic acid is ineffective in preventing the ketonuria in fasting rats previously fed a high-fat diet, even when this acid is administered in amounts far in excess of the quantity of glucose required to produce a marked decrease in the excretion of the ketone bodies.

A discussion of ketonemia vomiting in diabetic

and nondiabetic children by Hungerland brings out two opposing points of view, one favoring and the other disapproving the use of insulin in nondiabetic children with ketonuria due to vomiting. The important point is not to miss the diagnosis of diabetes. While carbohydrate feeding may be sufficient treatment in nondiabetics, it is not enough for the diabetic child in coma.

ENDOCRINOLOGY

The demonstration by Young that experimental diabetes can be produced in a dog by injections of large amounts of an extract obtained from the anterior lobe of the pituitary again centers attention upon the pituitary gland in relation to diabetes. Working at the National Institute for Medical Research at London, Young administered daily for twenty-six and twenty-one days, respectively, anterior pituitary extract to 2 dogs by the intraperitoneal route; as a result, they became diabetic and remained so after the injections were stopped, without showing any signs of recovery. A third animal similarly treated became only temporarily diabetic. The permanent diabetes thus produced differed from that of depancreatized dogs in that the pituitary-treated dogs appeared to be able to survive without insulin, retaining vigor, and in 1 case there was no loss of weight. The extract was prepared from fresh ox anterior pituitary glands, and all the procedures for extraction and preparation were carried out at temperatures approaching 0°C. In 1 dog, the extract from 490 gm. of ox pituitary was used.

In 1 dog of his series, four weeks after the cessation of injections, the sugar excretion was 264 gm. (24 gm. per kilogram) a day. The fasting blood sugar at the end of forty-eight hours was 256 mg. per cent. This dog became diabetic in September, 1936, and insulin was not given until March, 1937. Death occurred in coma on the sixth day after insulin was discontinued, and nearly ten months after the pituitary injections were discontinued. At autopsy, the liver was large and fatty, weighing 1030 gm., and the pancreas weighed 52 gm.

Young's experiments are epoch making. They mark the first successful production of diabetes by methods other than pancreatectomy, and furthermore, the first instance in which a chronic metabolic disease has been produced experimentally by the injection of material obtained from normal glands.

An alkaline extract of the anterior lobe of the pituitary has a marked diabetogenic action in both normal and diabetic subjects, according to Lassen and Hansen. They obtained an increased ammonia elimination due to the ketogenic effect. The height of the blood-sugar curve after a meal was increased only if the carbohydrate was limited, but the extent of the curve was increased.

Lämmli describes a case of acromegaly due to an eosinophilic adenoma in which the metabolism was 50 per cent above normal and the diabetes scarcely controllable with diet and insulin. Removal of the tumor did not help, but later thyroidectomy, although no signs of Basedow's disease was present, brought about disappearance of insulin resistance, glycosuria and hyperglycemia. It would seem in this case, therefore, that the insulin resistance was due chiefly to the increased metabolism, which was mediated through the thyroid gland.

The question often raised as to the possible benefits in diabetes of giving x-ray treatment to the pituitary is apparently answered rather completely by the studies of Pijoan and Zollinger. They studied the carbohydrate metabolism of patients undergoing massive radiation of the pituitary regions (because of the menopausal syndrome) before and after the radiations. Ten patients whose ages varied from twenty-nine to fifty received a total of 1400 to 1600 r skin doses over a period of fourteen days. Their blood-sugar curves were obtained after the oral administration of 1 gm. of dextrose per kilogram of body weight; in a second series of experiments the blood-sugar values were determined after the intravenous administration of 0.35 units of insulin per kilogram of body weight. Neither set of experiments showed any essential difference between the curves obtained before the radiation and after it. In 1 case the changes in the respiratory quotient were observed after dextrose and after insulin and again perfectly comparable curves were obtained. Pijoan and Zollinger conclude that such radiation of the pituitary gland caused no change whatever in carbohydrate metabolism. In commenting upon these fundamental observations, one would say, first, that a priori no very marked change should be expected in the function of a gland treated with clinical doses of x-ray in which the cells are of the normally differentiated type. It is really only in cells of new growths in which the differentiation of cell structure has not reached its final stage that irradiation may be expected to disturb the function. However, even in some such tumors of the pituitary the evidence that radiation produces any very great change is somewhat contradictory.

Carey, Arey and Norris report a case of myxedema and diabetes with autopsy. The carbohydrate tolerance was reduced when the basal metabolism was increased by thyroid treatment. This fact is to be considered in connection with the case of Escamilla, Lisser and Shepardson in whose

patient, a non-diabetic, the sugar-tolerance curve was greatly elevated by the giving of thyroid extract. When the metabolism once again fell to —22 per cent the blood-sugar curve went back to normal. Labbé holds that the frequency of exophthalmic goiter in diabetes is too great to be a mere coincidence. He feels that many cases are to be regarded as a true thyroid diabetes dependent upon a disturbance in thyroid glycoregulation, and differing from the ordinary pancreatic diabetes. However, in our experience among diabetic patients in whom the diagnosis of diabetes was clearly dependent upon hyperglycemia, glycosuria and a characteristic history, the fundamental severity of the diabetes has not been affected by operation upon the thyroid. Temporary severity, even acidosis, is helped by the reduction in metabolism following operation. Furthermore, at autopsy those cases have shown changes in the pancreas similar to those found in cases of diabetes without thyroid complications.

Meythaler and Mann found in both hyperthyroidism and myxedema a marked sensitiveness to insulin. (The patients studied were nondiabetics.) The authors explain this apparent contradictory finding on the basis of an altered functional status of the sympathicoadrenal system. Although hyperthyroidism is associated with an increased, and hypothyroidism with a decreased, sympathetic tonus, the response to insulin is the same, since in the former condition there is glycogen lack (due to hyperfunctioning of the sympathicoadrenal system), and in the latter normal glycogen content of the liver (due to hypofunctioning of the sympathicoadrenal system). An overproduction of adrenine in the presence of glycogen lack is without effect, while on the other hand rich glycogen stores, as in myxedema, represent a useless depot since the mobilizing agent, adrenine, is not present in sufficient amounts.

Fazekas, Himwich and Martin ligated the lumbo-adrenal veins of 8 cats distally and proximally to the adrenal glands, and at the same operation removed the entire pancreas. The animals were maintained without insulin or cortin. The survival period of the animals was definitely prolonged by the ligation, and 1 animal lived ninety-eight days. These experiments should be considered in relation to Long's demonstration of the ameliorating effect upon diabetes in depancreatized cats produced by adrenalectomy. Suggestions of the clinical effects of the adrenal gland are made by Langfeldt, whose patient, a man with melancholia, had moderate sensitiveness to insulin following an opium cure. He developed coma with 72 units of insulin. Langfeldt raises the question whether opium depresses the production of adrenine.

PHYSIOLOGY

The significance of the variations in the sugar content of other tissues of the body besides the blood is receiving study. An example is the study of the sugar in the skin previously reported by Urbach. Greif states that the sugar concentration of the marrow of the sternum is regulated within certain bounds independently of the blood sugar, and that its percentage represents the sugar formed locally in the tissues. The fasting values in 21 healthy subjects were between 39 and 155 mg. per cent. At times (12 cases) the sternal-marrow sugar was very different from the blood sugar. Sometimes it was lower and twice it was higher than blood sugar, a fact which suggested autochthonous regulation. To various tolerance tests with glucose, adrenalin and insulin there were similar variations in sternal-marrow sugar as with blood sugar, but of quite independent character, at times being later or earlier than with blood sugar, and at times showing divergencies in the curves.

LIVER

The early demonstration of Minkowski that the liver exerts the power of transforming levulose into glycogen is referred to by Paisseau, Ferroir and Mangeot, who report another case of levulosuria in a child of five. They state that there is no experimental evidence that insulin improves the metabolism of levulose. The reduction in the size of the liver in diabetic children as brought about by insulin in controlling the diabetes is more important than other measures. However, Eder and Gray successfully treated 5 such children with iron. They felt that the iron treatment was the main reason for the reduction in the size of the liver. Rathery and Froment, in reporting the case of a woman with gallstones, discuss the possible causation of diabetes by inflammation of the head of the pancreas along with gallstones. However, in their case little evidence of inflammatory effect either in the liver or the pancreas was found.

Terbrüggen in diabetic patients under fifty noticed no disease of the gall bladder. He holds also that the concurrence of diabetes with gallstones is not so frequent as to suggest a causal connection between the two.

Bridge utilized the respiratory quotient in a study of the glycogen reserve of the liver and the muscles in rabbits. At present there is no known way of estimating the glycogen reserve of either animals or human beings. Without doubt, in the future some method of determining the glycogen reserve will be found, and it will have an important place in the clinical study and treatment of patients. Bridge's rabbits in general showed a high fasting respiratory quotient, correlated with

rich glycogen reserves in the liver. On the other hand, the content of the muscle glycogen as determined immediately after death was not so clearly correlated with the respiratory quotient. These results were somewhat surprising in view of the fact that muscles constitute about 45 per cent of the total weight of a rabbit, and should have a correspondingly predominant influence upon the respiratory quotient. On the other hand, the liver, which represents only 4 to 10 per cent of the total weight, could hardly be expected to dominate the combustion in the body as it seemed to do in these rabbits.

The influence of other endocrine glands upon glycogen metabolism in the liver is receiving increasing attention.

In a brief communication Young reports that the livers and possibly the muscles of fasting rabbits injected with extracts of fresh ox (anterior lobe) pituitaries contained more glycogen than similar tissues of control animals. He suggests as an explanation that in the injected fasting animals glycogenesis proceeded at an increased rate.

Raab and Strauber obtained blood-sugar curves in 12 normal individuals, in 12 diabetic patients and in 10 patients with catarrhal jaundice, following each of two consecutive injections of 0.5 mg. of adrenalin at intervals of two and a quarter hours. Furthermore, tests were carried out on 5 normal individuals and 5 with catarrhal jaundice, after each of two administrations of 50 gm. of sugar at intervals of one and a half hours.

In all the normal individuals, following the giving of adrenalin and sugar, the second curve was lower than the first. In the diabetic patients, the effect of the first adrenalin injection was greater. Usually the peak of the second adrenalin curve lay higher than the first, but the absolute size of the second curve was on the average lower than the first, as in the normal cases.

In the cases of catarrhal jaundice the fasting blood sugar was normal. The effect of the first injection of adrenalin was somewhat decreased, but that following the first administration of sugar was increased. The second adrenalin peak lay, in contrast to the normal, without exception higher than the first; the absolute size of the second adrenalin effect remained on the average a little less than that of the first, as in the normal cases; in a few cases it was even greater. The peak of the second sugar-tolerance curve lay, in contrast to the normal, much higher than the first, the absolute size being on the average smaller than the first and smaller than in the normal cases.

The results in the diabetic patients were attributed by these authors on the one hand to lack of insulin and on the other to a disturbance of glycogenesis. In explaining the results obtained in catarrhal jaundice it was assumed that there was a diminished capability of the liver cells for taking up sugar, and in addition an intact and even increased intrahepatic metabolism of sugar taken up and a mild insufficiency of the pancreatic island apparatus. An increased sensitiveness to adrenalin does not exist in catarrhal jaundice, either in connection with blood sugar or with blood pressure.

The peculiar tendency for fat to be moved from other tissues and to be deposited in the liver has been a fundamental characteristic of diabetes. Kaplan and Chaikoff, working with completely depancreatized dogs, compared the fatty acid content of a mixed sample of entire liver with that in its lobes and in sections of them. The values obtained by these three types of sampling showed that fatty acids were not evenly deposited in the liver as fat accumulates. Because of this these authors point out that it is not fair to employ lobes and sections of lobes in estimating the fatty acid content of the whole liver.

Kaplan and Chaikoff found that it required a period of at least sixteen weeks to ensure a consistent finding of fatty acids in excess of 14 per cent in the livers of completely depancreatized dogs. Furthermore, if completely depancreatized dogs survive long enough, spontaneous regression of the fatty livers may occur despite the absence of raw pancreas in the diet during the entire period. The authors found that the ingestion of raw pancreas prevented the infiltration of fat in the livers of depancreatized dogs. They report that this factor is heat-stable in contradistinction to the heat-labile factor in the pancreas, which, when it is ingested by completely depancreatized dogs being maintained with insulin, produces an elevation in blood lipids above the normal.

Kaplan and Chaikoff maintain that although choline when given to completely depancreatized dogs influences deposition of liver fat, its curative action is slow, and daily feeding for a long time is required to produce measurable effects on livers in which large amounts of fat have accumulated. Furthermore, the authors find that choline does not raise the blood lipids in depancreatized dogs above the normal level, and in conclusion say that the pancreatic blood-lipid factor is therefore not choline.

In this connection, it is relevant to cite the views of Best, who does not maintain that the sole potent factor in raw pancreas is choline. Indeed, he recognizes four possible influences: choline as such; the protein of raw pancreas, which in itself has a lipotropic action; pancreatic enzymes, which by

their action may release more protein and choline; and the possible presence of betaine and other substances in raw pancreas which in addition to choline may possess lipotropic activity.

CARBOHYDRATE METABOLISM

Meythaler found that the regulation of carbohydrate metabolism during athletic exercise depends above all upon training. The more in training an individual is, just so much more efficiently does he store glycogen in his depots. Since we know that trained animals, even after activity which is completely exhausting, still possess a considerable amount of glycogen in the liver, it is improbable that pure glycogen deficiency is responsible for the different course of carbohydrate metabolism in sport. The factor of glycogen lack is at most to be considered in extreme activity as in marathon races. Rather, Meythaler believes that his results have shown above all that the different course of carbohydrate metabolism in sport is related to the different demands of the sympathicoadrenal system. Training implies an adaptation in the periphery to increased capability of action, which in turn depends presumably upon an increased activity of the vegetative nervous system. In the last analysis, the efficiency of the sympathicoadrenal system governs the degree of capability in a highly trained condition.

Sheldon, Johnston and Newburgh, using a respiration chamber, found that 3 normal, male, fasting subjects oxidized increasing amounts of glucose in response to increasing quantities of carbohydrate in the preparatory diet (used for three or more days prior to the day of the test). Furthermore, the subjects oxidized more glucose during the four hours of the test in response to increasing amounts of glucose ingested at the beginning of the test, even though the preparatory diet had been the same. The effect was additive when both sources of carbohydrate were increased simultaneously. The response of 3 male diabetic patients was qualitatively similar but quantitatively smaller. The ability of the diabetics to oxidize glucose was directly related to the severity of the disease. Carbohydrate, in excess of the ability of these diabetics to oxidize it, was of no benefit.

The interpretation of glucose-tolerance curves is often puzzling, especially in the presence of some complication. Peskin describes a small group of patients with symptoms in many respects similar to those of peptic ulcer, but in whom upon roentgenological examination no ulcer could be demonstrated. The author outlines the various criteria which distinguish this condition from true peptic ulcer, chief among these being the extraordinary response to the giving of 50 or 100 gm. of glucose by mouth. Instead of the usual blood-sugar curve obtained in the nondiabetic individual, the curve takes on a definitely negative characteristic; the blood sugar, instead of rising, descends to a low level (in the published curves, to as low as 50 mg. per cent), and then gradually ascends, although never attaining normal. These patients possess a high metabolic rate and show the symptoms of tachycardia, — excessive sweating, tremor, nervousness and eye symptoms, — suggesting a thyroid abnormality. Successful treatment consisted in placing the patient on a diet poor in carbohydrate and protein and high in fat.

Deren studied the dextrose tolerance of 50 subjects over fifty-five years of age without complications. One half of the group were studied with the ordinary 100 gm. dextrose-tolerance test, and in 16 a high prolonged curve was observed. In only 4 were normal blood-sugar curves observed. With the one-hour, two-dose method of Exton and Rose there were 21 diabetic and 4 normal types of sugar curves. This seems an extraordinarily high percentage and should encourage further study in this field.

Bergman and Drury found that the rate of utilization of glucose by eviscerated rabbits was affected by feeding and fasting prior to operation. The tissues of the fed animals utilized glucose at a rate double that of the fasted rabbits. The authors present evidence to show that this increase cannot be due to insulin but is rather due to some other influence, possibly that of the pituitary.

METHODS

Rhodehamel, Rose and Chen report the development of a simple and rapid method for determining sugar in the urine, and describe in some detail the apparatus needed and the method followed. The method is based upon that previously described by Sheftel, which depends upon the fact that the cuprous oxide formed by reduction takes on a yellow instead of a red color in the presence of a sufficient amount of creatinine and a hydrophilic colloid such as acacia. The yellow cuprous oxide forms different shades of color from green to yellow, with an excess of blue cupric irons, depending upon the amount of sugar present. A colored chart is used, the colors corresponding to various concentrations of glucose.

Greeley describes a method for complete pancreatectomy in the rabbit. His method calls for a three-stage procedure with three to four weeks between operations. Blood-sugar values in animals so depancreatized (fed without insulin) remained at a level of 400 to 500 mg. per cent.

NERVOUS SYSTEM AND DIABETES

The varied manifestations and clinical relation of hypoglycemia concern the psychiatrist and surgeon as well as the internist. The present attempts to treat schizophrenia and other psychoses by means of hypoglycemia induced by large doses of insulin afford the opportunity to witness many interesting neurologic manifestations, which according to Golden have not been described as arising as complications of diabetic treatment or symptoms of pancreatic adenoma. These may be classified as follows:

Prolonged manifestations, occurring for a longer period during the four to five hours of treatment:

Quick jerking movements of arms, legs and body and restless tossing of the head.

Prolonged sucking movements of lips.

Episodes initiated by flushing of face, dilation of pupils and labored breath, with rigid extension of lower extremities, bilateral adduction and extreme internal rotation of rigidly held arms, clinically suggesting decerebrate rigidity.

Partial manifestation of the above, the legs remaining normal.

Irregular, thrashing, apparently purposeless movements of the arms and legs, suggesting true defense reflexes.

Deep reflexes difficult to evaluate. Occasional Babinski and disappearance of corneal reflex.

Slow trombone-like movements and irregular jerks of tongue after other clonic movements.

Extremities showing "frozen athetoid movements."

Transitory hemiplegias.

All the above were most often bilateral but were at times unilateral.

Sudden manifestations, usually toward the end of treatment.

Frequent convulsive seizures.

Dramatic complications, suggesting that the whole central nervous system is thrown into a frenzy of disorganized activity.

If the patient did not react in forty-five minutes, even when intravenous glucose had been given, trouble was to be expected. The pupils were small, slowly dilated and were associated with marked flushing of the face. These followed convulsions, labored breathing and complete exhaustion. There were alternate periods of activity and relaxation, at times continued for one or two hours, the attack diminishing in severity and duration at each occurrence.

The tremendous importance of insulin hypoglycemia treatment in relation to schizophrenia is brought out by Cameron and Hoskins, who point out that because of the chronicity of this disorder, schizophrenic patients occupy one fifth of all the hospital beds in the United States. The spontaneous remission rate is from 20 to 40 per cent, and this makes it difficult to interpret the results of any treatment.

Lemere treated 17 chronic cases of dementia praecox and obtained a remission in 23 per cent. He believes that the effect of insulin shock is nonspecific, and that any agent that produces a convulsant action on the cerebral cortex has the same result.

Himwich and Fazekas studied the effect of hypoglycemia upon the brain metabolism. The brain seems to be the only organ which acquires its energy exclusively from the oxidation of carbohydrate. Its respiratory quotient in situ is unity. Furthermore, it has but little store of carbohydrate. Even in diabetes the respiratory quotient of the brain remains unchanged, according to the experimental work of these men. They state that there is no evidence that fat enters into the respiratory metabolism of the brain, because acetone substances are neither poured into the blood stream during diabetes nor absorbed for oxidation from ketonemic blood traversing the brain. They studied the changes in the brain of 14 dogs anesthetized with Amytal. During hypoglycemia the utilization of glucose on the average was 12.5 per cent and that of oxygen 7.99 per cent. When the blood-sugar values were as low as 22 mg. per cent, the utilization of glucose was less than of oxygen, showing that the small store of carbohydrate in the brain must have been utilized during this period of intense hypoglycemia. They considered it probable that the central nervous system ceased to function only when no further carbohydrate, either in the blood or in the brain, was available.

According to Page, whose new monograph reviews the entire present knowledge of the chemistry of the brain, brain tissue does not lose the power of converting glucose to lactic acid in diabetes, but little of the lactic acid produced is formed from glycogen, most of it being formed directly from blood sugar.

Electroencephalographic records during thirty-five insulin treatments of 6 schizophrenic patients are reported by Hoagland and his associates. After large doses of insulin the brain waves show a progressive decline of the alpha wave (Berger rhythm) of some 40 per cent, which parallels the declining blood-sugar curve. Sugar injections during the hypoglycemia restore the frequency. The present view is that alpha frequencies are directly proportional to the rate of carbohydrate metabolism of the cortical cells producing the rhythm.

Resistance to insulin was early noted by Sakel in certain cases of schizophrenia when insulin was given for hypoglycemia treatment. Varela-Fuentes and Rawak described 1 patient who received 160

units and another who received 350 units intravenously without much effect. Intravenously they gave as much as 360 units. They considered the possibility that in certain cases of this disease there exists on the part of the adrenal medulla an extraordinary capacity for reacting which permits an outpouring of adrenine which counteracts the insulin.

Quigley studied the effects of atropine or novatropine following the production of hypoglycemia with insulin in 6 normal medical students. He found that the hypoglycemic symptoms were effectively counteracted by moderate doses. However, after twenty-five or more minutes, in 50 per cent of the experiments, pronounced mental disturbances, chiefly amnesia and speech disturbances of varying intensity, developed, presumably because of a synergistic action of insulin with the other drugs used. The author warns against the use of atropine preparations in a patient with hypoglycemia unless due regard is given to the mechanism by which the hypoglycemia is produced.

Scott estimated the blood sugar following encephalography on 75 patients because of the reported observation that following the taking of encephalograms the blood sugar rises. The highest values obtained in his series averaged 152 mg. The maximum value was 234 mg. and the lowest 100 mg. The high values in most cases occurred in epilepsy and the low values were in cases of tumor of the brain. The author directs attention to a report by Reese in a case in which diabetic coma developed after encephalography, and the patient died.

Kraus and Chaney describe a man of thirty-six who was given antitetanic serum and developed pain, nausea, vomiting and finally atrophy of the muscles about the shoulder. Other patients in their series showed paralysis or disturbance of sensation, particularly of the hands or arms, but all recovered.

These symptoms of serum disease of the nervous system may possibly explain an unusual case in our experience. In Case 7150 the patient developed symptoms some few weeks after he began to use protamine insulin; these consisted of transitory weakness of one arm, then a weakness of the right foot with various reflex changes which were quite characteristic of multiple sclerosis. At the end of eighteen months the symptoms are now somewhat improved. Whether time will prove that this is a case of true multiple sclerosis rather than serum disease of the nervous system, we cannot tell.

COMPLICATIONS

Pregnancy. Since the introduction of insulin the number of diabetics who become pregnant has increased, largely owing to the prolongation of the lives of juvenile diabetics and the increased fertility of adult diabetics. Hurwitz and Irving report that, since 1916, 51 diabetics were delivered at the Boston Lying-in Hospital without death from diabetes. They discuss the fetal mortality given by previous writers, varying in the region of 45 per cent. The mortality at this hospital between 1916 and 1932 was 43 per cent; if, however, it were corrected to consider only those infants alive in utero at the first examination, the rate would be only 25 per cent. In 1932, 18 diabetic pregnancies had a gross fetal mortality of 17 per cent, though again, if correction is made, the rate is only 11 per cent. The high rate is due to acidosis, excessive size of the fetus and increased frequency of fetal anomaly. Hurwitz and Irving conclude that under proper management the diabetic mother may be expected to go through pregnancy and labor successfully. Cesarean section is reserved for cases in which the infants exceed normal weight or there are obstetric indications. They hold that insufficient stress is laid upon the peculiar types of toxemias seen in diabetic mothers, and particularly on the danger of pregnancy to young diabetic women whose diabetes began in childhood and is of long duration.

Tuberculosis. Our further experience with tuberculosis and diabetes is giving us a more hopeful attitude. Thus, in the follow-up of our acidosis cases at the Deaconess Hospital, a much lower rate of development of pulmonary tuberculosis is being encountered than formerly. The much improved prognosis in acute cases is well illustrated by the case reported by Shepardson and Noble; the patient was a registered nurse of thirty-four, with diabetes of five years' duration, who was taking insulin. Four years after the onset of diabetes she had diabetic coma, which required 175 units of insulin in twenty-four hours. Her acute illness with fever and night sweats and cough did not begin until a year after this coma, and she then had tuberculous pneumonia, the sputum showing many tubercle bacilli. There were two cavities. Artificial pneumothorax was used, with excellent results. During the next two years she gradually improved and since July, 1935, she had been carrying on her duties as a nurse.

Bertram, discussing his 80 cases of tuberculosis in diabetics again denies that he has ever had hemorrhages of the lung as a result of insulin injections. He believes that Kaiser's cases were given diets too low in carbohydrate, and that this may have been the cause of the bleeding, although he admits that possibly adrenalin could have been responsible. He urges high-carbohydrate diets.

One must still recognize the danger of tuber-

culosis in diabetic patients, particularly in the young. Dunlop emphasized this danger especially in children who have had coma. Interesting experiments on the development of tuberculosis were carried out by Schedtler on animals whose thyroid glands had been removed or which had been given thyroxin. The fact that tuberculosis seems to progress rapidly in the presence of myxedema is often commented upon. This is of interest in relation to the possibility that fat metabolism and particularly the cholesterol in the blood are factors in resistance to tuberculosis. This relation is clearly shown in diabetic patients who have had acidosis and lipemia.

Vascular Disease. Cardiovascular disease, together with peripheral vascular disease, continues to be a major problem in the treatment of diabetes. Radnai and Weisz studied 400 cases and made electrocardiographic examinations of 260 of them. Forty per cent of the latter cases showed changes; cardiac decompensation was discovered in 20 per cent and angina pectoris in 10 per cent. The frequency of cardiac decompensation of the congestive type is rather striking in this series. In general, at the Deaconess Hospital we have found that congestive failure occurs rather less frequently than in a general cardiac clinic.

Edelen emphasizes what we have so long practiced at the Deaconess Hospital, namely the avoidance of heat in the treatment of impaired circulation of the feet. The danger of increasing the tissue metabolism above the level where the blood supply is capable of providing sufficient circulation, and thereby hastening gangrene, is a real one. By all means continually repeat the warning to the patient: Do not have a hot-water bottle, hot stones, or any source of heat in bed with you.

Scupham and de Takats give an excellent review of the recent literature on peripheral vascular disease. De Takats comments especially on the methods of arteriectomy recommended by Leriche for cases with completely obliterated arteries. Leriche has emphasized that an obliterated artery ceases to function as a carrier of blood and becomes a diseased plexus of the sympathetic nerve fibers which maintain vascular spasm; he therefore advocates removing this section of the artery. De Takats, while granting that this is an important principle and deserves consideration, points out that the results of arteriectomy are not encouraging.

Dermatology. Sugg and Stetson describe a young man of twenty-seven, exceptionally obese, who developed lesions of xanthoma tuberosum on the elbows and knees at points where his occupation as a tile-setter had traumatized the skin. His diabetes was extremely mild; the blood cholesterol was only 170 mg. Two nodules were removed for biopsy; they showed foamy cells, and a diagnosis of fibroxanthoma was made.

Surgery. Atnan and Fenz studied the blood sugar before, during and after various types of anesthesia in nondiabetic and diabetic patients. They found that with Evipan given intravenously the blood sugar rose only slightly, even in the diabetic patient; with spinal anesthesia the increase was much less than with ether anesthesia but lasted longer. The authors conclude, however, that spinal anesthesia is not contraindicated in diabetes mellitus.

Continued improvement in the results of surgical treatment are reported where good medical and surgical teamwork is brought about. Williams and O'Kane report a five-year study of 496 cases. The mortality in cases with lower-extremity lesions, operated and unoperated, fell from 48 to 19 per cent.

Because of the distribution of surgical diabetics in the older age groups with impaired circulation, we have given further attention to the problem of pulmonary embolism following Barnes's excellent review from the Mayo Clinic. Our regime has already included, among other things, the rubbing of backs and turning of patients every two hours day and night and the use of the Balkan frame and other measures for exercising the upper extremities of all patients constantly in bed. We now insist that all elderly patients in bed flex and extend the legs and exercise the feet once an hour, and take several deep breaths or cough once an hour in order to promote venous return from the extremities. Finally, we have redoubled our efforts in this group to prevent abdominal distention as a definite factor in causing venous stasis in the pelvis and lower extremities.

Trauma. During 1937 appeared the volume *Trauma and Disease* edited by Brahdy and Kahn (Lea & Febiger); Chapter XV is devoted to "Trauma and Diabetes." In this chapter Joslin, Root and Marble have assembled the literature, mostly German, upon the subject and have added their own material. The forty-five page article is too long for review, but so few publications upon the subject have appeared in English that attention is called to it. An abstract of the article appears in Joslin's *Treatment of Diabetes* (Lea & Febiger, 1937).

In Germany, Umber has written extensively upon trauma and diabetes. In an address in Berlin he restated his earlier view: "Traumatic glycosurias occur, but there is no traumatic diabetes." In legal

studies, the most frequent errors come from the use of material which was published before the discovery of insulin. In those early days it was difficult to distinguish between glycosuria and diabetes. The classical type of the former is the glycosuria resulting from the Claude Bernard puncture.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTEMORTEM AND POSTMORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 24221

PRESENTATION OF CASE

A twenty-two-year-old, white, American law student entered the hospital with the complaints of stiffness of the legs and malaise.

Three weeks before entry he began to have vague pains in the joints, bones and muscles, particularly in the lower legs, which were somewhat stiff. He also noticed loss of energy, especially during the week before entry. During the two days before entry his ankles and elbows were painful on motion, and there was swelling of his ankles; his shins became sore, and a painful, tender red spot appeared on the index finger of his right hand. He did not feel feverish but was abnormally sensitive to cold. He had had a cold a month before entry, but that had cleared up, and he had had no further upper respiratory infection. There had been no nosebleeds, frequency or nocturia.

Thirteen years before entry, following a sore throat, he had had rheumatic fever, which was acute for one week and subacute for six months. He was kept in bed during that time. Three years later a definite diagnosis of aortic insufficiency was made, although at that time his heart was not enlarged and he was free of symptoms. His blood pressure was 100 systolic, 30 diastolic. During the next ten years he led a normal life with moderately restricted activity, and with the exception of occasional boils on his neck, had no significant symptoms until the time of his present illness.

Physical examination revealed a well-developed and nourished young man in no acute discomfort. There were definite petechiae on the right conjunctiva, both retinas and the right index finger, and questionable petechiae on the abdomen and back. The heart was enlarged to the right and left, extending 3.5 cm. beyond the left midclavicular line. There was a heaving apex impulse, with a loud apical first sound and a definite systolic murmur. There was also a loud, high-pitched, blowing diastolic murmur heard all over the precordium, most marked just to the left of the sternum. The pulse was regular and definitely of the Corrigan type. The blood pressure was 160 systolic, 30 diastolic. The lungs and abdomen were negative. Neither the liver nor spleen could be palpated.

The temperature was 101°F., the pulse 110. The respirations were 25.

Repeated urine examinations were negative except for rare red cells in the sediment of two specimens taken the day after entry. The blood showed a red-cell count of 4,230,000 with 80 per cent hemoglobin and a white-cell count of 16,700 with 72 per cent polymorphonuclears. The sedimentation rate was within normal limits. Two of four blood cultures contained *Streptococcus viridans*. An electrocardiogram showed the interventricular conduction time to be at the upper limits of normal. The T waves were deformed, suggesting an abnormal myocardial state.

During his three weeks' stay in the hospital he had an intermittent fever with almost daily variations between normal and 102°F. On the fourth day he complained of dull, steady, abdominal pain which was unrelieved by defecation or by the passage of gas by rectum. No definite spasm or localized tenderness could be made out in the abdomen. The pain gradually disappeared during the next three days. Several more petechiae appeared on the abdomen and toes, and on the eighth day he had a sudden, sharp pain in the ball of the right foot and at the base of the big toe. Two slightly red, exquisitely tender spots were present in these areas. On the seventeenth day he began to notice a feeling of increasing submanubrial constriction and complained of difficulty in getting his breath. There was little change in his heart except that the systolic murmur at the apex seemed louder and rougher. During the afternoon of the nineteenth day he began to cough continuously, with audible wheezing respirations. The coughing continued for three hours and was finally controlled by codeine and morphine. He raised no sputum and had no hemoptysis. During the period of coughing fine rales were heard at both bases and in the right axilla. The following morning there were definite dullness at both bases, slight distention of the neck veins and moderate cyanosis of the fingernails. He died on the twenty-first day.

DIFFERENTIAL DIAGNOSIS

DR. RICHARD C. CABOT: I can make nothing in particular out of "stiffness of the legs and malaise." If I had nothing but that to go on, I should have no idea whatever.

He was fairly young. That would account partly for his having so low a systolic pressure.

Dr. Mallory has had the habit lately of putting up to me cases that seem so perfectly obvious that I know I am wrong. They are perfect textbook cases which any first-year student can diagnose, and therefore I know there must be something ter-

ribly rare in the background. The question is, What is it? Up to date, I do not know. The history shows that he presumably had an old rheumatic heart lesion, — I suppose on the aortic valve, — and on top of that he had a subacute bacterial endocarditis associated with *Streptococcus viridans*. He had petechiae and tender spots in his fingers and toes dependent on that; these were accompanied by fever and a slight leukocytosis. Then he had something in his abdomen. Of course this is the sort of case where you might easily have an embolus in one of the mesenteric arteries or veins, but it would not disappear in three days and leave him as well as he apparently was. I cannot make any guess as to what was wrong in the abdomen.

His death seemed to be due to a straight failure of the myocardium with a filling-up of his lungs. One could easily imagine that that long attack of unproductive cough had to do with a lesion of the pleura — an embolism under the pleura, for instance, which would give pleural irritation and produce a cough like his. I think nothing of the sort will be shown. He may have had other emboli in the lungs, but in the absence of hemoptysis or other significant symptoms, I do not see how we can say so. His cardiac lesion should be aortic — subacute and chronic. He had a systolic murmur, as almost every cardiac case does; but it could perfectly well be due to the aortic lesion, and I do not see any way to be sure whether there was a lesion on the mitral valve. Mitral disease is commoner than aortic. In young hearts, on a statistical basis, one would say he might have something on his mitral valve if the disease has gone on as long as this. I can find no evidence of mitral stenosis or of any other lesion. His heart should be hypertrophied and dilated.

Is there any reason to suppose he has a coronary thrombosis? I do not see that there is. He can perfectly well have such, however, and the final termination may be due to that, resulting in sudden cardiac failure. But there is nothing to make us suppose it is, and nothing that I can see distinctive of it.

So far as I see, everything is consistent with acute or subacute endocarditis on top of an old rheumatic lesion with terminal heart failure and with presumably multiple emboli. Ordinarily in these cases you find post mortem many more emboli than there is clinical evidence for. I should not be surprised to find them in the spleen and kidneys, though the spleen was not enlarged and the urine showed no blood.

I take it the joints were not examined.

Dr. Tracy B. Mallory: No; if they had been I do not believe they would have shown anything. It is the sort of case where you get a great many more symptoms than you do pathologic lesions.

Dr. Cabot: I take it the main subacute lesion was aortic, whether or not there was anything mitral in addition.

Dr. Paul D. White: I saw this young man on one occasion about ten years ago, when he was a student, to confirm the diagnosis of aortic regurgitation of rheumatic origin. After that I did not see him until Dr. Maurice Fremont-Smith asked me to examine him during the acute illness. As Dr. Cabot said, the usual subacute-bacterial-endocarditis diagnosis seemed to fit the picture until a rather abrupt change took place in his clinical condition; that is, something definitely happened on the seventeenth day when he had the feeling of increased constriction and difficulty in breathing which made him acutely ill. He had not been sick for many weeks, and it was not a terminal case by any means, so far as the ordinary picture of subacute bacterial endocarditis is concerned. I thought he had had a pulmonary embolus.

Dr. Cabot: Do you think they are going to find anything in the mitral valve?

Dr. Maurice Fremont-Smith: I thought so before he died. He had a perfectly definite, low, rumbling murmur that was typical of mitral stenosis. It seemed that both valves were involved. The striking thing was that this boy was extremely well when he came to my office, with a temperature of only 100°F., with a four-week history of feeling below par and with evidence of petechiae. I sent him to this hospital. He was comfortable except for the three-day period of pain in the abdomen. We could not explain that. There was one symptom not mentioned in the history. He was unable to take a deep breath without increase in the pain. After recovery from this three-day episode he was happy, lying in bed reading and writing until the acute change with an attack of paroxysmal coughing, which was incessant. He coughed for three hours without being able to stop. He was given 4 gr. of morphine. His dyspnea became increasingly evident, and he became slightly cyanotic. He coughed up a little blood about two days after the onset of cough. We were not struck with the signs of congestive failure. We felt at first that it might be acute dilatation with pressure on the recurrent laryngeal nerve because there was not much in his chest. Later on, we examined the chest carefully and I found a bit of consolidation in the right back.

Dr. Henry D. Stebbins: Could not a rupture of one of the cusps of the aortic valve explain the picture?

DR. CABOT: Do you think he had coronary embolus?

DR. WHITE: Neither rupture of a valve nor coronary embolism was seriously considered. Our attention was focused more on the cough, the blood-spitting and the cyanosis. We should have thought, however, of valve rupture.

DR. CABOT: Did you think he had infarction in the lung?

DR. WHITE: Yes.

CLINICAL DIAGNOSES

Subacute bacterial endocarditis.
Rheumatic heart disease with aortic and mitral insufficiency.

DR. CABOT'S DIAGNOSIS

Subacute bacterial endocarditis, aortic valve.

ANATOMICAL DIAGNOSES

Endocarditis, subacute bacterial, aortic and mitral valves.
Ruptured mycotic aneurysm of mitral valve.
Rheumatic heart disease, healed, aortic valve, with aortic insufficiency and left ventricular hypertrophy and dilatation.
Pulmonary edema and congestion, acute.
Hydrothorax, bilateral, marked.
Hyperemia of liver and kidneys.
Infarct of spleen.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The salient feature of this case seems to me to be the very sudden cardiac failure in a boy who had had bacterial endocarditis for an apparently short period of time and whose disease up to the morning of the terminal episode was progressing at a slow rate. I doubt if anyone a week before death would have expected a sudden event such as this. The actual findings at autopsy were quite unusual and come nearer to the suggestion of a rupture of one of the leaflets of the aortic valve than anything else that was mentioned, although it was not that.

In a great many cases of bacterial endocarditis involving the aortic valve the vegetations spread down onto the base of the cusps and extend onto the long leaflet of the mitral valve, where they develop on its ventricular surface. Sometimes they penetrate directly through the valve and you get sudden marked mitral insufficiency. In this case the ulceration must have been progressive for a considerable period of time before clinical symptoms appeared because there had been time to produce an aneurysm between the two surfaces of the mitral cusp, essentially a mycotic aneurysm. This was nearly 3 cm. in diameter. At its apex we found a relatively small perforation which I think was probably a terminal event. I should imagine that

Figure 1.

in this case the mycotic aneurysm of the valve had been developing for a long time. It then ruptured, and the sudden mitral insufficiency accounted for the rapid onset of failure. The finding of marked bilateral pleural effusions and an extreme grade of acute pulmonary congestion and edema seem to substantiate this hypothesis.

Figure 1 shows the ventricular surface of the mitral valve and the relatively wide area of ulceration of the base of the leaflet, which is really the mouth of the aneurysm. In Figure 2 the valve has been turned over to show its auricular surface, and the aneurysmal sac is evident with a slit-like perforation near the right-hand margin. The sac was very thin walled and consequently has collapsed almost completely, but in life, when it was distended with blood, it must have nearly filled the valve ring and one would suppose it must have produced a marked grade of stenosis.

DR. SPRAGUE: Was there any rheumatic involvement of the mitral valve?

DR. MALLORY: We thought there was a little, but it was hard to be sure of. Old rheumatic involvement of the aortic valve was obvious, however. I should add that there was comparatively

little evidence of embolism. There were no emboli in the lungs, and the coronaries were clear. One large infarct was present in the spleen and must

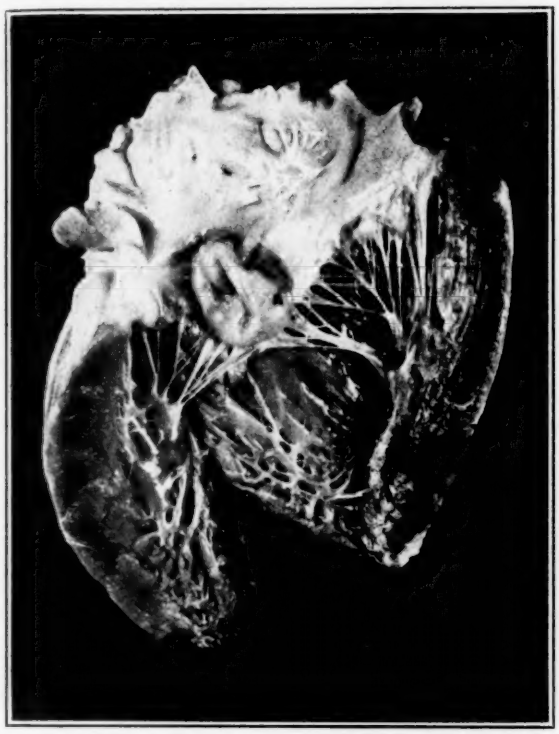

Figure 2.

have been the cause of the attack of abdominal pain. Even the kidneys failed to show the usual embolic glomerulitis.

CASE 24222

Presentation of Case

A twenty-one-year-old, white, American woman entered the hospital with the complaints of weakness, nausea, vomiting and epistaxis of seven days' duration.

The patient stated that she had been born with heart trouble and had always lived a restricted life. She was always mildly dyspneic on climbing a flight of stairs and never had been able to take part in athletics. Aside from this she had no other symptoms and had finished high school at the age of nineteen. About fourteen months before entry she began to have pains in the calf muscles, and red macular lesions appeared on her legs which usually lasted a few weeks and then disappeared only to recur later. She was also much weaker than she had been before, tired more easily, and consequently spent most of the time in bed. She remained in bed for practically the entire year before entry. Ten months before entry her urine became dark amber colored, and her physician told her that she had kidney trouble. At no time did she have frequency, dysuria, nocturia or frank hematuria. During the period from eight to five months before entry she had had three attacks of pleuritic pain in the left lower lateral chest, which lasted from ten to fifteen days and were somewhat relieved by strapping. Seven months before entry she had had some pitting edema of the ankles which disappeared on complete bed rest; there was no edema around the eyes. For the two months before entry she had an unproductive cough. Seven days before entry she had severe epistaxis from her left nostril, losing "well over a quart of blood." This occurred at the time when she expected a menstrual period, and the period itself did not occur. She said that for seven years she had always had mild epistaxis during her menstrual periods. For the seven days before entry she was unable to retain food by mouth because she vomited everything eaten. She was given repeated rectal taps but steadily lost ground. She was very nervous, weak, dyspneic and orthopneic, and had definite fever. For two or three weeks before entry she noticed small, painful red spots at the tips of her fingers and toes.

One of her sisters was known to have congenital heart disease.

Physical examination revealed a very pale, fairly well-developed but undernourished woman, who appeared to be acutely and chronically ill. There were small, round purpuric spots on the dorsa of the feet, and the fingers were slightly clubbed. The heart was very slightly enlarged to the left, and in the pulmonic area, systolic and diastolic thrills and murmurs could be made out. The pulmonic heart sounds were both very loud. A systolic murmur was heard at the apex. The heart rhythm was regular, and the blood pressure was 90 systolic, 30 diastolic, in both arms. The lungs were negative. The abdomen was held tense, but both the liver and spleen could be felt three fingers below the costal margin. There was slight dilatation of the neck veins, but no peripheral edema.

The temperature was 100.5°F., the pulse 125. The respirations were 25.

The urine had a specific gravity of 1.020, contained a large trace of albumin, and the sediment showed 20 red cells, many white cells and a few casts per high-power field. The blood showed a red-cell count of 3,040,000 with 40 per cent hemoglobin, and a white-cell count of 23,600 with 92 per cent polymorphonuclears. The blood Hinton was negative. The corrected sedimentation rate was 0.6 mm. per minute. An electrocardiogram showed moderate left-axis deviation and low voltage. A portable x-ray of the chest showed enlarge-

ment of the heart on both sides, and haziness in the right lower lung field.

On the third hospital day there were diminished breath sounds and dullness in the lower third of the right lung and slight pitting edema of the ankles. Her skin was cold, clammy and cyanotic, and she had Cheyne-Stokes breathing. She was put into an oxygen tent without much benefit and died that evening.

Differential Diagnosis

Dr. Howard B. Sprague: When a patient states that she was born with heart disease the observation may or may not be correct. In the main it is correct because, at an early age, congenital heart disease is to be expected and rheumatic heart disease is very rare under the age of five. We can assume that this patient had been observed constantly from birth; furthermore, she had one sister with congenital heart disease. I think it is fair to assume then that we are dealing with a congenital deformity of the heart and not an early rheumatic lesion. That is supported by the physical findings which show, most particularly, systolic and diastolic thrills and murmurs over the pulmonic area. Systolic and diastolic murmurs may well be called a continuous murmur, and a continuous murmur in that area implies a diagnosis of patent ductus arteriosus. Pulmonary stenosis with pulmonary regurgitation is extremely rare. We have seen only one such case in association with a congenital absence of the pulmonary valves with a very small pulmonary artery, and in that case the diastolic murmur was slight and there was no thrill with it.

There are two main types of patent ductus arteriosus so far as hemodynamics are concerned. The commoner type is that without cyanosis in which the flow is from the aorta into the pulmonary artery and in which, therefore, the arterial blood mixes with the blood of the pulmonary artery and cyanosis does not occur except as a terminal phenomenon when something comes up to raise the blood pressure in the pulmonary circulation, thus producing a flow in the opposite direction. This patient showed cyanosis only as a terminal affair. The other type is that found with a persistence of the fetal blood channels, that is, a flow from the pulmonary artery to the aorta, whereby non-oxygenated blood is shunted past the lungs into the aorta and systemic circulation. There was a mild degree of clubbing of the fingers in this case, which would perhaps help in the diagnosis of congenital heart disease, or perhaps would be related to the infection which we will take up later. The blood pressure finding of 90 systolic, 30 diastolic, is consistent with patent ductus arteriosus because this condition causes the peripheral signs of aortic regurgitation due to a rapid passage of a portion of the blood from the aorta into the pulmonary artery, thus causing a rapid drop in the diastolic level.

An electrocardiogram showed moderate left-axis deviation. Patent ductus arteriosus puts a strain on both sides of the heart because the right ventricle has to pump against an increased pressure in the pulmonary artery. The left ventricle also has added work because the blood which passes from the aorta directly back to the lungs through the pulmonary artery returns at once to the left heart and has to be re-pumped into the peripheral circulation. This double strain is commonly found in the non-cyanotic type of patent ductus. We might get some help in diagnosis if we found, by x-ray, dilatation of the pulmonary artery from the increase in the pressure.

Dr. George W. Holmes: I assume that, since the lung fields are dense on both sides, this is a portable film taken when the patient was quite ill. The supracardiac shadow is unusually wide. It is magnified by the portable film but still I think there is no doubt that it is wide.

Dr. Sprague: It would support the idea that the pulmonary artery is dilated?

Dr. Holmes: Yes, it certainly would.

Dr. Sprague: Something else has occurred in the course of this patient's history to bring on the fatal termination: infection has apparently arisen. It has resulted in fever, in petechial spots, in what I assume to be pulmonary emboli, and in a certain amount of bleeding from the kidney, probably from miliary emboli. If we are right in assuming that a subacute bacterial endocarditis has been added to the picture, then it would be consistent with our assumption that she had pulmonary infarcts, because, if blood is flowing from the aorta to the pulmonary artery, vegetations which break off would get into the lesser circuit. Such an occurrence has been observed on several occasions in this hospital, so that I believe this is the rather common combination of subacute bacterial endocarditis grafted on a congenital lesion, although it is really an endarteritis rather than an endocarditis or valvitis. The heart itself in the region of the apex has a systolic murmur, of which I can make nothing diagnostic so far as valvular disease is concerned.

Dr. Tracy B. Mallory: I take it you are assuming that the bacterial vegetations are at the actual site of the ductus arteriosus.

Dr. Sprague: I should think that they might involve the orifice of the ductus, perhaps on the pulmonary side.

Clinical Diagnoses

Congenital heart disease with acute or subacute bacterial endocarditis.
Patent ductus arteriosus?
Chronic nephritis.

Dr. Sprague's Diagnoses

Congenital heart disease.
Patent ductus arteriosus.
Subacute bacterial endarteritis of the patent ductus, with infarcts in the lungs and kidneys.

Anatomical Diagnoses

Congenital heart disease — patent ductus arteriosus.
Subacute bacterial endocarditis, aortic and mitral valves.
Bacterial endarteritis, pulmonary artery.
Infarcts of lung, spleen and kidneys.
Embolic glomerulonephritis.

Pathological Discussion

Dr. Mallory: I asked Dr. Sprague that last question for the purpose of emphasizing a point which seems to me very interesting. His answer was the natural one and his prediction would usually be correct; but it was not in this case, however. There was a patent ductus, of course — an extremely short one, however. The aorta and the pulmonary artery were in actual apposition and a small round hole led from one to the other. It was impossible to recognize any vessel. The mouths of the hole on both sides — aorta and pulmonary artery — were free from vegetations. There was a bacterial endocarditis, however, which was on the aortic and mitral valves, and there was another similar vegetation in the pulmonary artery. This lay proximal to the orifice of the ductus and was clearly separated from it by a distance of 2 or 3 mm.

The relation of bacterial endarteritis to congenital heart itself has always been a very mysterious one. Next to rheumatic heart disease it is the most predisposing factor. Ordinarily, bacterial endocarditis in these cases develops on the deformed valve, if there is one, or at the site of abnormal connections between the various chambers of the heart, such as a congenital septal defect or a patent ductus arteriosus. Here we have a case with no evidence of deformity of any of the valves; but we have congenital heart disease and bacterial endocarditis combined, and the endocarditis is not at the site of congenital malformation.

A Physician: Where did it start?

Dr. Mallory: I should rather suppose it started on the aortic valve and worked around from there. There was also a thrombus in the right auricle. However, this did not seem to be bacterial in origin.

A Physician: Were there any pulmonary emboli?

Dr. Mallory: Yes: one or two that appeared to be frankly septic in character. There were emboli in the kidneys, which showed a well-marked embolic glomerulonephritis. There was an infarct of the spleen, which was not indicated by anything in the history.

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The Journal does not hold itself responsible for statements made by any contributor.

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A MODEL STATE INSTITUTION

Envy is a normal response of the human personality to certain situations, yet it is not considered a virtue but is looked askance upon by society. However one who has lived in Massachusetts during the last year and has been familiar with the humiliating, and to some extent, degrading, developments in the Department of Mental Diseases can properly be forgiven for being envious when reading the report *A Survey of Methods of Care, Treatment, and Training of the Feeble-minded at Letchworth Village* [New York State].

In summarizing the report, Dr. C.-E. A. Winslow, professor of public health at the Yale University School of Medicine, who served as chairman of the survey committee, says:

> The first quarter-century of Letchworth Village represents a notable chapter in the history of institutional care of the mental defective. A long succession of governors and legislatures have contributed to its support. An excellent State Department of Mental Hygiene has guided and assisted its development. A great executive, endowed with common sense, sympathy, and courage, built himself into its organization. A Board of Managers of unique vision and devotion — among whom the names of Franklin B. Kirkbride, its vital mainspring through all the years, and of Mrs. E. H. Harriman, who made the Research Department possible, must be mentioned with special gratitude — formulated its program and directed its policies. With the pursuance of that program and the continuance of such leadership the story of Letchworth's second quarter-century should be as significant as the first.

Massachusetts stands at the crossroads. One way leads to continued deterioration. This way involves the use of political patronage, the appointment of second-rate trustees, and a commissioner appointed solely on the grounds of political expediency. The other way calls for a revival of past ideals; a commissioner of great ability and energy chosen only on the grounds of previous achievement and ably and vigorously supported by the governor in his efforts; trustees chosen from the enlightened, socially minded leaders of the community who have no purpose in their trusteeships other than the elevation of the standards of the care of the insane; and individual hospitals with a professional staff which is free from annoyances by selfish politicians and whose members are leaders in their departments of medicine and in their communities, striving only to render a fine account of their stewardship to the people of Massachusetts.

THE ADVERTISEMENT SECTION

Probably few of the readers of the *Journal* appreciate the importance of its advertising contracts to the Massachusetts Medical Society. All members of the Society know that the annual operating loss of the *Journal* — approximately twenty thousand dollars — is covered by an appropriation from society funds and that in consideration of this,

every member whose dues are fully paid becomes automatically a regular subscriber. Fifty-two copies are received each year at an approximate total cost of four dollars, or eight cents a copy.

Improvements in the *Journal* result in additional expense, and unless other sources of revenue are increased, the net result is an increase in the operating loss — a charge to the Society.

The largest source of revenue is from advertising contracts; during 1937 it amounted to more than twenty thousand dollars. The *Journal* has nothing to do with obtaining the majority of contracts, as they are forwarded by the Cooperative Medical Advertising Bureau, of Chicago, a subsidiary of the American Medical Association. This organization negotiates the contracts with firms which advertise nationally in state medical journals, and the only acceptable copy concerns drugs, therapeutic agents and foods which are acceptable to the respective approving committees of the American Medical Association.

Advertising revenue is bound to vary with general business conditions, but there is every indication that the cancellation of contracts that is threatening or has occurred during 1938 is due, in no small part, to lack of interest on the part of the readers in patronizing the advertisers in the *Journal*. Their purpose is not altruistic, but practical, and if there is no indication that their advertisements are being read, they cancel their contracts.

The *Journal* takes this opportunity of humbly requesting its subscribers to read more carefully the advertisement section. Although it is impossible to dress this up as attractively as is done by our plutocratic lay contemporaries, it should be remembered that the products advertised therein represent acceptable therapeutic aids as supplied by manufacturers of the highest ethical standing. Every inquiry to an advertiser makes the *Journal* a better advertising medium and indirectly results in its improvement through increased revenue.

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY

M. Fletcher Eades, M.D., *Secretary*
19 Bay State Road
Boston

Case History No. 74. Bleeding Due To Cervical Polyp

Mrs. T. G., a thirty-four-year-old nullipara, was seen on January 20, 1938, complaining of painless vaginal bleeding. She came for examination to find out whether she was pregnant, her last regular period having started July 16, 1937, making her due for delivery the end of April.

The family history was of no value. Her mother and father had died in another country of unknown causes; three brothers and one sister were living and well. Previous medical and surgical history of the patient was negative except for pneumonia in 1931. Catamenia began at fourteen and was regular and of the twenty-eight-day cycle, lasting six days.

A detailed history of the painless vaginal bleeding is as follows. On July 16, 1937, the patient menstruated regularly. There was a period of amenorrhea until October 1, which the patient naturally considered as indicating pregnancy. From October 1 to November 25 there was intermittent spotting, some days fairly profuse and other days just noticeable. At no time was there any pain. From November 25 to January 8 the patient was symptom free except for questionable abdominal enlargement. On January 8 there was a slight flow for one day, and on January 15 flowing necessitated the wearing of a pad.

On examination the abdomen was enlarged to the size of a six-months' pregnancy. Definite fetal parts were palpated, and the fetal heart tones were heard. Pelvic examination revealed an enlarged and soft cervix, with a polyp the size of a large grape protruding from the os. The base of the polyp was very near the external os and easily visualized on speculum examination. Very slight trauma to the polyp caused immediate bleeding.

Considering the location of the polyp, the marked congestion which it showed and the feeling that it was the causative factor of the bleeding, removal seemed advisable. A Ferguson speculum was in-

A series of selected case histories by members of the section will be published weekly.

Comments and questions by subscribers are solicited and will be discussed by members of the section.

serted, the polyp was grasped with a sponge forceps, and the base deeply cauterized. After removal of the polyp there was very slight bleeding from the base, which was further cauterized to control the ooze.

The patient was advised to return home, remain quiet in bed for forty-eight hours, and report any bleeding or untoward symptoms. A report from the patient four weeks after removal of the polyp was completely negative.

On April 10 after a perfectly uneventful primiparous labor lasting eight hours, she was delivered by low forceps of a 7 lb., 14 oz., female child. Her convalescence was uneventful, and both mother and baby were discharged well.

Comment. Cervical polyps as a complication of pregnancy are not uncommon. Naturally as the age of the patient advances the possibility of polypoid development increases, since polyps develop secondary to chronic cervicitis of rather long standing. Their diagnosis is made by a history of irregular bleeding, by vaginal examination, — the polyp being felt inside the cervix, — and lastly by inspection. The importance of an early pelvic check-up is shown in this case. If this patient had been seen earlier, the polyp could have been removed when not so congested and with a greater feeling of ease, since naturally the farther along in pregnancy a patient is, the more one wishes to avoid instrumentation of the genital tract, thereby minimizing the chances of infection. Removal and cauterization of the base should cause no trouble so far as the pregnancy is concerned. The possibility of inducing labor is very remote since deep cauterization of the canal is not done. Because of the constant flow and the possibility of hemorrhage during and after delivery, these vascular tumors should be removed during the early prenatal course.

EPILEPSY

John is a fifteen-year-old schoolboy, healthy, happy, the pride of his parents and the mainstay of his neighborhood ball team. One day while sitting quietly in his seat at school, John makes a groaning noise, all his muscles become rigid, his breathing stops, his face turns blue, he falls heavily to the floor, his arms and legs jerk violently for a minute or so. then thoroughly exhausted he sleeps, and wakes without any knowledge of what has happened. Instead of having a convulsion, perhaps he simply stops what he is doing, stares vacantly for a few seconds unconscious of his surroundings, then resumes his work as though nothing had happened. Or, what is least likely, John may suddenly begin to act as though confused or intoxicated. Though he appears to know what he is doing, he cannot be guided or controlled. Then after some minutes he is himself again.

A "Green Lights to Health" broadcast given by Dr. William G. Lennox on Wednesday, May 18, and sponsored by the Public Education Committee of the Massachusetts Medical Society and the Massachusetts Department of Public Health.

These are three different forms which epileptic seizures may take. An epileptic may have any one, or all these kinds of seizures. They may occur but once in a lifetime, or may recur at intervals of hours, days or years.

The New Testament contains a vivid word picture of a distracted father bringing to Jesus his son who was subject to convulsions. The disease, said the father, cast the son "into the fire and into the water" and even as he came he "fell on the ground and wallowed foaming." Confronted with this medical problem, modern physicians are oftentimes as baffled as were the disciples of Jesus. For centuries both before and after the time of Christ the epileptic was believed to be possessed of a demon. Though we moderns may not believe this, in the fastidious society of the present a "fit" is still looked at with horror and the person who is subject to such attacks is oftentimes cut off from normal associations and employment.

The problem of epilepsy is of importance to the state as well as to the individual. In the United States there are more than 500,000 persons who are, or have been, subject to seizures. Of this number about 40,000 are housed in various state institutions, at a cost for maintenance alone of about $18,000,000 a year. However, more than 90 per cent of patients are in the community, and if given a proper chance, the great majority of these would be able to live fairly normal lives.

What can be the cause of this terrible condition which like a wild animal leaps upon the innocent and unsuspecting person? Epilepsy would best be considered a symptom rather than a disease. As in the case of other symptoms, headache for example, the cause may differ for different persons or for the same person from time to time. Furthermore, the symptom may not be the result of a single cause but the sum total of several.

First, I shall mention the various causes of seizures. The first cause is heredity. This factor has been overemphasized. Only about one fifth of patients with seizures know of a relative who was similarly affected. The inheritance of diabetes is as great as that of epilepsy. The "susceptibility" is present in all who develop the condition, but whether seizures actually appear may depend on additional acquired causes.

Causes which are most likely to start epilepsy in a predisposed individual are injuries or infections of the brain, and the most serious time for such to occur is at birth or in infancy.

Epilepsy may also be stimulated by the failure of some organ in the body. For example, disease of the kidneys may result in the accumulation of poisons which irritate the brain and start convulsions. Then in some patients constipation, poor posture, a hidden infection, a weak heart or an emotional disturbance will precipitate an attack. In every case the seizure originates in the brain, but these other disorders may increase the irritability of nerves and set off an attack. From the aspect of treatment, removal of such last straws may save the camel's back.

How can the cause or causes of seizures in a given individual be determined? Because the causes are different in each person, every person with seizures should have careful physical and laboratory examinations. By no other means can abnormalities either of the brain or of the body be detected. Recently, a most important instrument called the electroencephalograph which makes a record of the electrical currents in the brain has been perfected.

What is the treatment of epilepsy? First, efforts should be spent in correcting any cause discovered by the physician in his examinations. The second line of treatment is to increase the patient's resistance to attacks by the maintenance of robust physical and mental health. The diet

should be varied and should include meat. In the case of children, striking benefit has often been secured through the use of the so-called ketogenic diet — a diet that is rich in fats and poor in starches.

Drugs are not curative but are useful as sedatives to lessen the number or severity of convulsions. Of course drugs as well as other treatment should be at the direction of the physician, otherwise more harm than good may result. Patent medicines, the advertisements of which fill the mailboxes of patients, contain no new or unknown medicines. They are merely one or the other of two well-known drugs, given in unknown doses at exorbitant prices.

Contrary to popular opinion, weakening of the mind does not necessarily or even usually occur. There is need for the education of the family and the public to the attitude that recurring seizures are not dreadful things but are only, like sick headaches, temporarily incapacitating. So far as feasible the patient himself should go ahead in spite of epilepsy. Millions have done this. Many persons of eminence have been epileptic: witness Mohammed, Julius Caesar, Lord Byron, Swedenborg, Napoleon Bonaparte, and many others.

In ending, let me emphasize that epilepsy is more a symptom than a disease. The causes vary in different persons. The finding and the treatment of the causes require careful examinations and long-continued treatment at the hands of a doctor who is both interested and informed. There is great need of a changed attitude on the part of the public toward seizures and toward epileptics. New methods of treatment have recently been found, but there is crying need for more adequate support of research in this disease.

Q. My child had a convulsion when he was teething. What chance is there that he will have convulsions later in life?

A. According to one investigator, the chances are five times greater than if he had not had any such trouble; in other words his chances of getting epilepsy are about one in forty instead of one in two hundred.

Q. What is the difference between luminal and phenobarbital?

A. They are the same. Luminal is the name used by a certain manufacturing firm and costs more than phenobarbital.

Q. Is there no hope of finding a medicine better than phenobarbital?

A. Yes, of course. In fact studies now underway give encouragement in this direction.

Q. A friend of mind has a boy about twelve years old who is having very bad convulsions; his mother is very nervous about keeping him at home. Is there any place where such a child can be sent? They do not have much money.

A. Eleven of the states including Massachusetts maintain colonies for epileptics where care is given without charge. As you may suppose, practically all the patients in these colonies are physically and mentally far below normal, and there is the question whether a mentally normal child should be sent to them.

Q. But this child is quite bright and most of the time is very lovable. The parents do not want to "put him away" in a big institution. Is there no private place where he can be taken care of inexpensively?

A. Unfortunately in spite of the obvious need there seems to be a lack of small adequately staffed and yet inexpensive hospitals for the care and treatment of early cases.

Q. If this is such an important sickness why do the doctors not get busy and find out the cause and cure?

A. Some doctors are busy. Research work is being carried on in several centers, Boston being a principal one. The Harvard Epilepsy Commission is organized for the purpose of collecting funds to be used in this research.

Q. A friend of mine writes me that she is frantic because her child has started having convulsions. She has consulted about all the doctors in her town, but they say they know little about this and just say wait and see if the child will outgrow it. You said that much new knowledge had been gained recently. What I want to ask is this: Are the doctors who know most about this disease explaining what they know to the doctors who know little about it? And also, Is there any place to which a person could write, or is there any printed material that they could get, which would explain about the disease and special treatments that might be tried?

A. That is a large double-barreled question. The doctors have indeed formed a society called the League Against Epilepsy for gaining and scattering information. Also there is the Epilepsy Commission of Harvard University to which your friend might write.

Q. You spoke about the need of funds. Why would not the prevention and cure of epilepsy be as good a way to employ government funds as finding a cure of hog cholera or building little used roads?

A. Why not?

Q. You spoke of the necessity of consulting a doctor. How do you explain the following? A neighbor of mine went to many doctors without help, then sent off for a patent medicine and has not had a spell since. Another neighbor had the same experience after going to an osteopath.

A. There is great variability in the frequency of seizures. Patients even without any treatment may have long periods, sometimes years in length, without an attack. As for the patent medicine, I have explained that these contain the drug usually prescribed by doctors, but the patient may have taken it in much larger doses than the doctor would consider safe. Excessive doses of these sedatives can make the cure worse than the disease.

Q. Would you advise marriage as a means of stopping attacks?

A. No. The idea that marriage is a cure is inherited from the Middle Ages.

Q. Then does marriage make attacks worse?

A. Again no, unless marriage brings added burdens and worries or undermines general health.

Q. I still am not clear as to your position about marriage. Do you or do you not forbid a person with epilepsy to marry?

A. I do not forbid them. I give the available statistics and explain the pros and cons, and let the patient decide — as he would decide without my advice.

Q. Children who begin to have epilepsy should, I suppose, be taken out of school.

A. No. They should maintain such mental activity as is consistent with normal exercise, recreation and sleep.

Q. But how about the harm to other children which would come from seeing a convulsion? Would you want your own child in the same classroom with an epileptic?

A. Of course there is a limit as regards the number and severity of attacks which can be tolerated in a classroom. However, I personally believe that a good many of the nervous ills of adults are due to overprotection in childhood. We cannot be shielded or run away from unpleasant sights all our lives. Early acquisition of a matter-of-fact attitude toward seizures is advantageous. I want my children to associate with and have a sympathetic attitude toward children who are making a brave fight against some physical handicap, and I should object to a beginning or mild case of epilepsy being taken out of school on their account.

Q. I know a young woman who has the light, petit-mal spells which you described. A man wants to marry her, but does not know of her attacks. Ought she to tell him?

A. By all means. Aside from the question of fairness, keeping him in ignorance would be legal grounds for divorce in some states.

DEATHS

DEZELL — Frederick Burr Dezell, M.D., of Lynn, died February 2. He was in his seventy-first year.

Born in New York, he received his medical degree from the Johns Hopkins University School of Medicine and then settled in Lynn.

Dr. Dezell was a fellow of the Massachusetts Medical Society and the American Medical Association.

His widow, a son and daughter survive him.

LASKEY — Edward P. Laskey, M.D., of 48 Highland Avenue, Haverhill, died April 23. He was in his fifty-sixth year.

Born at Dover, New Hampshire, he attended the public schools there, later graduating from Dartmouth College and receiving his degree in 1908 from the Harvard Medical School. For a year after he left Dartmouth, Dr. Laskey taught at the Weyland High School, serving as submaster.

After serving a two-year internship at the Boston City Hospital he started a general practice in Haverhill. Dr. Laskey was a specialist in the use of radium and was one of the first doctors in the vicinity of Haverhill to acquire equipment and use radium extensively. In 1915 he sailed with the Harvard unit, to Falmouth, England, for service in an English field hospital. A former member of the Gale Hospital, he was a consultant on the staff of the Hale Hospital at the time of his death. For many years he served as school physician.

Dr. Laskey was a fellow of the American Medical Association and the Massachusetts Medical Society. He also was a member of the Pentucket Medical Association and the Haverhill Medical Club.

His widow, a son, daughter, brother and sister survive him.

MISCELLANY

COURSE FOR MEDICAL SECRETARIES

Realizing that a doctor needs a secretary with qualifications quite different from those of the ordinary business secretary, Boston University's college of practical arts and letters, in conjunction with the school of medicine, is completing the first year of the new medical secretarial course which was started last fall. The first group of students will graduate a year from this June.

Miss Elizabeth W. Carvell, assistant professor of secretarial studies, supervises the office training, and Dr. Helmuth Ulrich, associate professor of clinical pathology, is chief counselor in medicine. The aim of the course is to make it so practical that when a girl completes her work she can step into a doctor's office and carry on the secretarial work competently without the usual eight months or a year that doctors now have to spend in training a girl for their specialized work.

"A doctor's secretary must be different from any other type of secretary," said Miss Carvell. "Dealing successfully with sick people takes an entirely different psychological outlook than that needed by a girl who works in a lawyer's office or in a bank. Unless a doctor can afford both a nurse and a secretary, his assistant must be able to care for his supplies, to perform first aid, to make blood tests and analyses, all in addition to her general duties of caring for correspondence and bookkeeping."

NOTES

Dr. Harvey Cushing, Moseley Professor of Surgery (emeritus), Harvard University, and Sterling Professor of Neurology (emeritus), Yale University, has been made an honorary member of the Biological Society of Vienna.

Dr. Walter B. Cannon, George Higginson Professor of Physiology, Harvard University, recently delivered the William H. Welch lectures at Mount Sinai Hospital, New York City. The titles were "Some New Aspects of Homeostasis" and "The Aging of Homeostatic Mechanisms."

A grant for an indefinite period of time by the permanent Science Fund of the American Academy of Arts and Sciences has been made to Dr. William C. Boyd of the Boston University School of Medicine. It will enable Dr. Boyd to continue his research in blood groupings, which chiefly concerns a determination of the relations existing between peoples living now and those living in the earliest known period of history.

CORRESPONDENCE

ALEXANDER POPE'S PHYSICAL DISABILITIES

To the Editor: The fact that great physical disability and suffering have never been a bar to distinguished literary achievement is so well known as to require little comment. We have but to think of the Brontës, Heine, Parkman and the great Russian surgeon, Pirogoff, among numerous others.

The following quotation concerning Alexander Pope is interesting in this connection. It is from a volume entitled *From Anne to Victoria. Essays: By various hands* (edited by Bonamy Dobree: Cassell & Company, 1937), and is quoted from an "Essay on Pope," by W. H. Auden.

> If Pope's social advantages were few his physical charmes were even less. Only four feet six in height he was already a sufferer from Pott's disease, the "little Alexander whom the women laugh at," and in middle age was to become really repulsive . . . so weak as to stand in need of perpetual attendance, extremely sensitive to cold, so that he wore a kind of fur doublet under a shirt of a very coarse warm linen with fine sleeves. When he rose he was invested in a bodice made of very thick stiff canvas, being scarcely able to hold himself erect till they were laced, and he then put on a flannel waistcoat. One side was contracted, his legs were so slender that he enlarged their bulk with three pairs of

stockings, which were drawn on and off by the maid for he was not able to dress or undress himself, and neither went to bed or rose without help. His weakness made it very difficult to be clean. His hair had fallen most all away.

WILLIAM PEARCE COUES, M.D.

12 Monmouth Court,
Brookline, Massachusetts.

ARTICLES ACCEPTED BY THE AMERICAN MEDICAL ASSOCIATION COUNCIL ON PHARMACY AND CHEMISTRY

To the Editor: In addition to the articles enumerated in our letter of March 31 the following have been accepted:

Calco Chemical Co., Inc.

Mandelic Acid — Calco

Cheplin Biological Laboratories

Cheplin's Epinephrine Hydrochloride Solution, 1:1000, 10 cc.

Cheplin's Epinephrine Hydrochloride Solution, 1:1000, 30 cc.

Lederle Laboratories

Viosterol (A.R.P.I. Process) in Oil

Eli Lilly & Co.

Ampules Metycaine 10 per cent for spinal anesthesia

Ampules Metycaine 20 per cent for infiltration and regional anesthesia

Wm. S. Merrell Co.

Ampules Solution Dextrose 50 per cent, 100 cc.

Parke, Davis & Co.

Cevitamic Acid — P. D. & Co.

Tablets Cevitamic Acid — P. D. & Co., 25 mg.

Schieffelin & Co.

Sulfanilamide Tablets — Schieffelin, 5 gr.

S.M.A. Corporation

3:Pyridine Carboxylic Acid (Nicotinic Acid) — SMACO

3:Pyridine Carboxylic Amide (Nicotinic Acid Amide) — SMACO

The following product has been accepted for inclusion in the List of Articles and Brands Accepted by the Council But Not Described in N.N.R. (New and Nonofficial Remedies, 1938, p. 508):

Armour & Co.

Thyroid — Armour

PAUL NICHOLAS LEECH, *Secretary.*

535 North Dearborn Street,
Chicago, Illinois.

REPORT OF MEETING

SUFFOLK DISTRICT MEDICAL SOCIETY AND BOSTON SURGICAL SOCIETY

A joint meeting of the Suffolk District Medical Society and the Boston Surgical Society was held April 20 at the Boston Medical Library.

The meeting was opened by Dr. Conrad Wesselhoeft. Following a brief presentation of medical-society business, Dr. Wesselhoeft turned the meeting over to Dr. William C. Quinby. Dr. Quinby then introduced Dr. Augustus Thorndike, Jr., who presented a paper on "Trauma Incident to Sports and Recreation: Diagnosis and treatment."

Dr. Thorndike pointed out the increasing importance of trauma in competitive athletic sports during recent years, in which time participation in both organized and unorganized sports has been steadily increasing. The most serious injuries in his experience are encountered not in football, as might be expected, but in skiing, baseball and polo. An even larger number of less serious injuries, chiefly sprains, strains and contusions, are encountered in these sports. A detailed knowledge of the lesions involved in these injuries is essential if they are to be given proper treatment.

The fundamental pathologic disturbance is similar in sprains, strains and contusions, the difference depending on the location and extent of the injury. First, there is a tearing of tissue, followed by hemorrhage, which in extent may far exceed the original tear. Subsequently, the hematoma is absorbed, and coincidentally, a fibroblastic proliferation begins the process of repair. In specialized tissues, such as tendons and ligaments, this fibroblastic repair constitutes a permanent weakening, which is the basis for the axiom: "Once a sprain, always a sprain."

Contusions may be classified as superficial, joint or muscle contusions. In competitive sports, the most common muscle contusions are seen in the thigh and knee. The usual superficial contusions occur on the lower leg or forearm, and most of them are near enough to the integument to make cold applications feasible in causing local vasoconstriction and, hence, limitation of hemorrhage. Cold should be applied for at least an hour, followed by the application of a pressure bandage. In severe contusions, rest of the injured part is essential, combined with cold applications and pressure. Sponge-rubber pressure dressings are very useful in injuries involving joints.

The second stage of the treatment of contusions consists in hastening the resorption process by heat and massage. This should not be undertaken until hemorrhage has stopped completely.

Deep-muscle contusions are occasionally complicated by myositis ossificans traumatica. If this occurs near the end of a long bone or in the region of a joint it may result in permanent impairment of function. It may be suspected by the continued failure of a deep contusion to respond to treatment. X-ray diagnosis is usually not possible until the fifteenth day. The condition usually disappears with continued heat treatment.

The treatment of sprains is based on the same principles as that of contusions, and consists, first, in limiting the hemorrhage as much as possible and, secondly, in facilitating resorption and repair. It is essential to ascertain accurately the pathologic anatomy in each case. By careful palpation it is possible to determine the ligaments involved in any sprain. In ankle sprains, the most common type of injury is a tear of the anterior tibiofibular ligament; injuries to the medial and lateral collateral ligaments are less common. A series of lantern slides were shown to illustrate the treatment of sprains, showing the marked limitation of swelling obtained by the immediate application of cold and pressure bandages. Areas of ecchymosis along the borders of sponge-rubber dressings demonstrated the degree to which deep hemorrhage had been limited. The duration of disability depends largely

upon the amount of hemorrhage immediately following a sprain.

It was pointed out that strapping an acute sprain with adhesive plaster is a mistaken form of treatment. Strapping should be reserved for the later stages when the swelling has subsided, and is chiefly useful in preventing recurrent sprains. In competitive sports at Harvard, any players who have a history of sprain at any time within several years are strapped each day before entering contact work.

The types of strains were discussed briefly, with lantern slides to illustrate the lesions and their treatment.

The incidence of the more serious injuries, such as fractures, dislocations and internal injuries, is comparatively low in organized sports. The fractures received in football have been less serious than those in baseball and polo. In the unorganized sports, particularly skiing, there is a high incidence of severe injuries. Furthermore, in these sports there are fewer facilities for prompt first-aid or medical attention.

Dr. Thorndike's paper was discussed by Dr. B. A. Godvin, who said that the prompt treatment which had been emphasized was rarely possible in industrial and street injuries. He agreed that the early control of internal hemorrhage determined the length of disability. Dr. Henry H. Faxon cited the prevalence of athletic injuries in the younger age groups, which are lacking in full physical growth and development. He suggested that too heavy protective equipment might contribute to some of these injuries. He also called attention to the simultaneous use of a pressure bandage and cold applications in the early treatment of sprains. Dr. Charles C. Lund discussed the occurrence of injuries in skiing, which he thought were somewhat exaggerated. He mentioned the need for more adequate first-aid facilities in ski areas. Dr. Thorndike recommended the training of lay people for proper first-aid work in the unorganized sports.

NOTICES

TUMOR CLINIC, BOSTON DISPENSARY

Each Tuesday and Friday morning from ten to twelve-thirty there is a meeting of the Tumor Clinic of the Boston Dispensary, a unit of the New England Medical Center. All kinds of tumors are seen, discussed, and when indicated, treated with radium and high-voltage x-ray.

Physicians are welcome to visit this clinic and bring patients to the clinic for diagnosis.

AMERICAN CONGRESS OF PHYSICAL THERAPY

The seventeenth annual scientific and clinical session of the American Congress of Physical Therapy will be held co-operatively with the twenty-second annual convention of the American Occupational Therapy Association, September 12, 13, 14 and 15, at the Palmer House, Chicago. Preceding these sessions, the congress will conduct an intensive instruction seminar in physical therapy for physicians and technicians — September 7, 8, 9 and 10.

The convention proper will have numerous special program features, a variety of papers and addresses, clinical conferences, round-table talks, and extensive scientific and technical exhibits.

Information concerning the convention and the instruction seminar can be obtained by addressing: The American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING MONDAY, JUNE 6

TUESDAY, JUNE 7

*10 a. m. 12:30 p. m. Tumor clinic. Boston Dispensary.

12 m. Massachusetts General Hospital. Surgical staff conference. Amphitheater.

WEDNESDAY, JUNE 8

8 a. m. Massachusetts General Hospital. Grand rounds. Orthopedic department.

THURSDAY, JUNE 9

9 a. m. Massachusetts General Hospital. Surgical grand rounds.

9 a. m. Massachusetts General Hospital. Neurological staff clinic. Ether Dome.

12 m. Massachusetts General Hospital. Clinicopathological conference.

FRIDAY, JUNE 10

10 a. m. Massachusetts General Hospital. Fracture rounds.

*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.

SATURDAY, JUNE 11

*10 a. m. - 12 m. Staff rounds at the Peter Bent Brigham Hospital. Conducted by Dr. Henry A. Christian.

*Open to the medical profession.

JUNE 2 — New England Society of Physical Medicine. Page 902, issue of May 26.

JUNE 6, 7, 8, and 9 — American Association of Industrial Physicians. Page 499, issue of March 17.

JUNE 10 and 11 — American Heart Association. Page 707, issue of April 21.

JUNE 13, 14 and 15 — American Board of Obstetrics and Gynecology. Page 903, issue of May 26.

JUNE 13-17 — American Medical Association. San Francisco.

JUNE 13, OCTOBER 8 and NOVEMBER 15 — American Board of Ophthalmology. Page 282, issue of February 10.

JUNE 20-24 — Canadian Medical Association. Page 902, issue of May 26.

JUNE 23 — Pentucket Association of Physicians. Hotel Bartlett, 95 Main Street, Haverhill, 8:30 p. m.

SEPTEMBER 12-14 — American Association for the Study of Goiter. Page 545, issue of March 24.

SEPTEMBER 12-15 — American Congress of Physical Therapy. Notice above.

OCTOBER 17-21 — Clinical Congress of the American College of Surgeons, New York City.

OCTOBER 24-26 — Academy of Physical Medicine. Scientific Session. Washington, D. C.

DISTRICT MEDICAL SOCIETIES

HAMPDEN

Meeting will be held on the fourth Tuesday in July.

PLYMOUTH

Meeting will be held at 11 a. m. on July 21.

BOOKS RECEIVED FOR REVIEW

Men Past Forty. A. F. Niemoeller. 154 pp. New York: Harvest House, 1938. $2.00.

Transactions of the American Gynecological Society. Edited by Richard W. TeLinde. Volume 62, for the year 1937. 258 pp. St. Louis: The C. V. Mosby Company, 1938.

Syphilis, Gonorrhea and the Public Health. Nels A. Nelson and Gladys L. Crain. 359 pp. New York: The Macmillan Company, 1938. $3.00.

Workbook on Elementary Diagnosis for Teaching Clinical History Recording and Physical Diagnosis. Logan Clendening. 167 pp. St. Louis: The C. V. Mosby Company, 1938. $1.50.

Clinical Roentgen Therapy. Edited by Ernst A. Pohle. 819 pp. Philadelphia: Lea & Febiger, 1938. $10.00.

Management of the Sick Infant and Child. Langley Porter and William E. Carter. Fifth revised edition. 874 pp. St. Louis: The C. V. Mosby Company, 1938. $10.00.